The
OHIO STATE UNIVERSITY
BULLETIN

VOLUME L JULY 30, 1946 NUMBER 25

GRADUATE SCHOOL

ISSUE FOR

1946 - 1947

SESSIONS

PUBLISHED BY THE UNIVERSITY AT COLUMBUS

Entered as second-class matter November 17, 1905, at the postoffice at Columbus, Ohio, under the Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917. Authorized July 10, 1918.

The Ohio State University Bulletin is issued twenty-five times during the year: once each month in August, September, October, November, and December; twice each month in January, February, and March; three times each month in April and July; four times each month in May and June.

GRADUATE SCHOOL

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THE OHIO STATE UNIVERSITY
COLUMBUS

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UNIVERSITY CALENDAR

1946

SUMMER QUARTER

June 17 to 24	Physical Examinations for all new students.
June 17	Latest day for registration and payment of fees before classes begin.
June 18	Classes begin, 8:00 A.M.
June 22	Intelligence Test for all new students.
July 4	Independence Day. No classes.
July 23, 24	Final Examinations, first term (at last regular class hour).
July 24	First term ends, 12 Midnight.
July 25	Second term begins, 8:00 A.M.
July 27	Intelligence Test for all new students.
August 26, 27, 28, 29, 30	Final Examinations.
August 30	Summer Convocation (Commencement), 9:00 A.M.
August 30	Summer Quarter ends, 12 Midnight.

AUTUMN QUARTER

September 25 to 30	Freshman Week.
September 30	Physical Examinations for students other than Freshmen.
September 30	Latest day for registration and payment of fees before classes begin.
October 1	Classes begin, 8:00 A.M.
October 5	Intelligence Test for all new students other than Freshmen.
November 11	Armistice Day. No classes.
November 28	Thanksgiving Day. No classes.
December 16, 17, 18, 19, 20	Final Examinations.
December 19	Autumn Convocation (Commencement), Thursday, 2:00 P.M.
December 20	Autumn Quarter ends, 12 Midnight.

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WINTER QUARTER

January 2 to 9	Physical Examinations for all new students.
January 2	Latest day for registration and payment of fees before classes begin.
January 3	Classes begin, 8:00 A.M.
January 4	Intelligence Test for all new students.
February 22	Washington's Birthday. No classes.
March 11, 12, 13, 14, 15	Final Examinations.
March 14	Winter Convocation (Commencement), 2:00 P.M.
March 15	Winter Quarter ends.

SPRING QUARTER

March 24	Latest day for registration and payment of fees before classes begin.
March 25	Classes begin, 8:00 A.M.
March 24 to 29	Physical Examinations for all new students.
March 29	Intelligence Test for all new students.
May 30	Memorial Day. No classes.
June 3, 4, 5, 6, 7	Final Examinations.
June 1	Baccalaureate Sermon.
June 6	Class Day.
June 6	Spring Convocation (Commencement).
June 7	Alumni Day.
June 7	Spring Quarter ends.
June 17	Summer Quarter (1947) classes begin.
August 29	Summer Quarter (1947) ends.
September 30	Autumn Quarter (1947) classes begin.

ADMINISTRATION

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Residence: Ohio State University Campus—UN-3148, Campus 274

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Residence: 39 Chatham Rd.—LA-9096

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Residence: 82 W. Dominion Blvd.—LA-6635

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Residence: 265 E. Tulane Rd.—LA-3606

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Residence: 1474 Doone Rd.—KI-1702

Dean of Women.....CHRISTINE YERGES CONAWAY
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Residence: 1280 Glenn Ave.—KI-1770

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Office: 120 Chemistry Building—UN-3148; Campus 723, 301, 302
Residence: 184 Torrence Rd.—LA-4625

Director of Bureau of Public Relations.....HAROLD K. SCHELLENGER
Office: 106 Administration Building—UN-3148; Campus 721
Residence: 516 Piedmont Rd.—LA-8738

Director of the Twilight School.....LUKE K. COOPERRIDER
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THE GRADUATE SCHOOL

1945-1946

Dean.....ALPHEUS W. SMITH

Office: 309 Administration Building—UN-3148; Campus 717
Residence: 232 16th Ave.—WA-1924

Dean Emeritus.....WILLIAM McPHERSON

Office: Chemistry Building—UN-3148; Campus 698
Residence: 198 16th Ave.—WA-1579

Secretary.....ALICE A. MORAN

Office: 309 Administration Building—UN-3148; Campus 718
Residence: 987 Woodhill Drive—KI-6048

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1945-1946

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ARTHUR E. BAGGS, L.H.D., Professor of Fine Arts
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GLENN W. BLAYDES, Ph.D., Associate Professor of Botany
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JOHN B. BROWN, Ph.D., Professor of Physiological Chemistry
FOSTER R. DULLES, Ph.D., Professor of History
D. LUTHER EVANS, Ph. D., Professor of Philosophy
HAROLD P. FAWCETT, Ph.D., Professor of Education
JOSEPH H. GOURLEY, Ph. D., Professor of Horticulture
CHARLES H. HANDSCHIN, Ph.D., Professor of German, Representing Miami University
FRANK A. HARTMAN, Ph.D., Professor of Physiology
ARCH O. HECK, M.Sc., Ph.D., Professor of Education
THOMAS C. HOLY, Ph.D., Representing the Bureau of Educational Research
ROBERT M. KING, M.Sc., Professor of Ceramic Engineering
RALPH A. KNOUFF, M.A., Ph.D., Professor of Anatomy
THOMAS H. LANGLOIS, M.S., Ph.D., Director of the Franz Theodore Stone Laboratory and Professor of Zoology
EDWARD MACK, JR., Ph.D., Professor of Chemistry
CHARLES E. MacQUIGG, E.M., Representing the Engineering Experiment Station
AUGUST C. MAHR, Ph.D., Professor of German
EARL N. MANCHESTER, B.A., University Librarian
JAMES S. OWENS, Ph.D., Director, Industrial Research Foundation
WILLIAM R. PARKER, Ph.D., Professor of English
ROBERT D. PATTON, Ph.D., Professor of Economics
TIBOR RADO, Ph.D., Professor of Mathematics
THOMAS S. SUTTON, M.Sc., Ph.D., Professor of Animal Husbandry
JOHN B. TITCHENER, Ph.D., Professor of Classical Languages
GEORGE W. WHITE, Ph.D., Professor of Geology
RUSSELL S. WILLCOX, M.A., C.P.A., Professor of Accounting
M. EMETT WILSON, Ph.D., Professor of Music

FELLOWS AND SCHOLARS FOR THE YEAR 1945-1946

UNIVERSITY FELLOWSHIPS

JOHN MILTON BLOCHER, JR.....Chemistry
HARLEY PROCTER BROWN.....Zoology
FREDERICK GARRETT DICKASON.....Botany
EDNA A. MAISNER.....Psychology
MARIA ELISABETH SKIDMORE.....Fine Arts
OLIVE WOODRUFF.....Education

UNIVERSITY SCHOLARSHIPS

GEORGE LEWIS CAVINESS.....German
JOAN SARA MENKIN GERVER (Mrs.).....Psychology
DOROTHY JUNE RANNEBARGER (Mrs.).....Romance Languages
MARTHA LEE SAENGER.....Political Science
MARY KATHRYN SELBY.....Romance Languages
CAROLYN RUTH TURRELL.....English
GEORGIANA BABB.....German
MICHAEL BOBAL.....Chemical Engineering
CHARLES GOODE GOMILLION.....Sociology
PEGGY HEIM.....Economics
GARNETT LOUISE QUEEN.....Psychology
JOAN SCOTT.....Psychology
THORA LOUISE COOKSEY.....Romance Languages

ELIZABETH CLAY HOWARD SCHOLARSHIP

HOYT LEON SHERMAN.....Fine Arts

MARY S. MUELLHAUPT SCHOLARSHIP
(Post-doctoral)

MAIRE WEIR KAY.....Zoology

RESEARCH FOUNDATION FELLOWSHIPS

WILLIAM SPENCER FONES.....Chemistry
MARY LOUISE FRECHTLING.....Physiological Chemistry
ALVA THOMPSON.....Chemistry

OUT-OF-STATE TUITION SCHOLARSHIP

NORMAN BAYARD GREEN.....Zoology
ALICE J. GUNN.....Home Economics
JESSIE MAE HALSTED.....Education
DAVID G. WHITE.....Horticulture
ABNER JEROME WOLLAN.....Physics

OHIO COLLEGE TUITION SCHOLARSHIP

BETTY JANE DUNCAN (Wilberforce University).....Romance Languages
NANCY KING (Denison University).....Psychology

STILLMAN W ROBINSON FELLOWSHIP

A. MORSE BETTISON.....Mechanical Engineering

JAMES E HAGERTY SCHOLARSHIP

MASON C. BENNER.....Social Administration

BOWNOCKER FELLOWSHIP

HAROLD J. BISSELL.....Geology

DEVELOPMENT FUND SCHOLARSHIP

LLOYD SMITH.....Physics

WESTINGHOUSE FELLOWSHIPS (Pre-doctoral)

FRANK ROBERT WOODS, JR.....Physics

FRANKLIN H. PATTERSON MEMORIAL SCHOLARSHIP

ESTELLE FEIN.....Social Administration

SCHOOL OF SOCIAL ADMINISTRATION ASSOCIATES, INC. SCHOLARSHIP

THOMAS BAKER JONES.....Social Administration

COMMUNITY CHESTS AND COUNCILS, INC. SCHOLARSHIP

RICHARD HICKS.....Social Administration

ROBERT G. PATERSON SCHOLARSHIP

EDGAR NEWTON BROWN.....Special

MRS. CHARLES B. MANNING SCHOLARSHIP

SYLVIA CUPP EVANS.....Social Administration

OHIO COLLEGE STAFF TUITION SCHOLARSHIP

VINCENT JOHN WOTTLE (University of Dayton).....Chemistry

WESTMINSTER FOUNDATION SCHOLARSHIP

MILDRED WINKLE.....Education

KIMBERLY FELLOWSHIPS

JOHN M. BLOCHER.....Chemistry
JAMES R. TOMLINSON.....Chemistry

BATTELLE MEMORIAL INSTITUTE FELLOWSHIPS

LAWRENCE M. LITZ.....Chemistry
LLOYD ARTEN SNAVELY.....Metallurgy

JOHN H. SMITH SCHOLARSHIP

VERNEL SMITH.....Social Administration

NATIONAL WHOLESALE DRUGGISTS ASSOCIATION FELLOWSHIPS

JAMES HENRY DAVIS.....Business Organization
ALBERT BENJAMIN FISHER, JR.....Business Organization

ERDIS G. ROBINSON SCHOLARSHIP

JAMES A. YOUNGBERG.....Social Administration

THE OHIO STATE UNIVERSITY

LOCATION

The Ohio State University is situated within the corporate limits of the city of Columbus. It is supported by appropriations from the State and Federal governments. The University has 1,800 acres of land with 417 acres in the campus, 383 acres in the University Airport, and 1,000 acres in the farm. The total value of land, buildings, and equipment is $29,433,787.47.

ORGANIZATION

For convenience of administration the departments of the University are grouped into organizations called Colleges. The Ohio State University comprises ten Colleges and a Graduate School, each under the administration of a Dean and College Faculty, as follows:

Graduate School, College of Agriculture (including the School of Home Economics), College of Arts and Sciences (including the School of Journalism and the School of Optometry), College of Commerce and Administration (including the School of Social Administration), College of Dentistry, College of Education (including the School of Fine and Applied Arts and the School of Music), College of Engineering (including the School of Mineral Industries), College of Law, College of Medicine (including the School of Nursing), College of Pharmacy, College of Veterinary Medicine.

NOTE: Bulletins describing the work of the several Colleges may be obtained by addressing the University Examiner, The Ohio State University, Columbus 10, and stating the College in which the writer is interested. (For list of bulletins, see the last page.)

THE UNIVERSITY YEAR—FOUR QUARTERS

The University year is divided into four Quarters, each approximately eleven weeks in length. The Summer Quarter is further divided into two terms of approximately six weeks each. Complete courses that are so announced may be taken for either term or for the entire Quarter.

This *Bulletin* is devoted to the work of the Graduate School for the Autumn, Winter, and Spring Quarters, 1946-1947. The announcements for the Summer Quarter are printed in the Summer Quarter Bulletin.

THE GRADUATE SCHOOL

GENERAL INFORMATION

The office of the Graduate School is located in Room 309, Administration Building. The office is open from 8:00 a. m. to 5 p. m. daily, except Saturday. On Saturday, it is open from 8:00 a. m. to 12:00 m.

ORGANIZATION AND ADMINISTRATION

The instruction and training of graduate students has been one of the functions of The Ohio State University since 1878, when the first graduate student was in residence. For a number of years the graduate work of the University was unorganized and each department conducted its own work with little reference to that of other departments. After the University was divided into colleges, each college controlled the graduate work offered in the various departments constituting that college. In 1902, however, the graduate work

within the College of Arts had assumed sufficient proportions to warrant the organization of a Graduate School to secure an effective and systematic arrangement of the graduate work of that college. Finally in 1911, there was organized the Graduate School of the University to administer all the graduate work offered in the several departments of the University. This School is under the administration of a Graduate Council consisting of thirty-three members. The membership of the Council is made up of the following: the Dean of the Graduate School, the Director of the Bureau of Educational Research, the Director of the Bureau of Business Research, the Director of the Engineering Experiment Station, the Director of the Industrial Research Foundation, a representative of the Ohio Agricultural Experiment Station, the University Librarian, twenty-three members of the instructional staff appointed from among those departments offering graduate work in The Ohio State University, and a representative from the faculty of Miami University. This Council reports directly to the University Faculty, which is the legislative body of the Graduate School, as well as of the ten colleges.

All communications and inquiries regarding matters connected with the Graduate School, whether from prospective students or from those whose work is in progress, should be directed to the Dean of the Graduate School.

AGREEMENTS BETWEEN THE OHIO STATE UNIVERSITY AND OTHER INSTITUTIONS CONCERNING GRADUATE WORK

In order that certain educational and research institutions may be able to take advantage of the facilities of the Graduate School, and also in order that these institutions may be utilized for the pursuit of research work in connection with the Graduate School, agreements have been made between the Board of Trustees of The Ohio State University and the following institutions:

(a) **With Miami University.** Miami University is represented upon the Graduate Council of The Ohio State University. Part-time assistants connected with the instructional staff of Miami University may pursue their graduate work for the Master's degree at Miami University subject to the supervision of the Graduate Council of The Ohio State University, and upon the successful completion of the same will receive their degrees from The Ohio State University. Such students must be registered in the Graduate School of the Ohio State University while pursuing their work.

(b) **With the Merrill-Palmer School.** A graduate of The Ohio State University who has completed all the necessary undergraduate requirements may fulfill the residence requirement for the Master's degree by satisfactorily completing one Quarter of acceptable work in residence at The Ohio State University, and two additional Quarters of acceptable work in residence at the Merrill-Palmer School. Before entering the Merrill-Palmer School, the candidate must confer with the chairman of the department at The Ohio State University in which he wishes to specialize, under whose direction a general course of study for the Master's degree will be arranged. The thesis subject must be of such character as to enable the candidate to carry on experimental work at the Merrill-Palmer School.

The final examination of the candidate will be conducted by a committee consisting of members of the instructional staff of this University together with representatives of the Merrill-Palmer School, according to the rules governing the Master's degree. The thesis must meet with the approval of both the Merrill-Palmer School and this University.

Students carrying on work at the Merrill-Palmer School under the above regulations must also register at the same time in the Graduate School of this University, but will not be required to pay fees in this University.

(c) **The Perkins Observatory.** The Perkins Observatory is jointly maintained and administered by the Ohio Wesleyan University and The Ohio State

University. Its facilities are, therefore, available for students registered in the Graduate School desiring to pursue research work in astronomy or astrophysics.

The principal instrument of the Observatory is a large reflecting telescope, the mirror for which was cast by the Bureau of Standards and is the first large piece of optical glass made in this country. The reflecting surface measures 69 inches in diameter and offers an unusual equipment for astronomical and astrophysical research. There is an auxiliary photographic doublet for six-inch aperture, and a solar objective of 25 feet focal length.

The Observatory is also provided with auxiliary scientific equipment which will afford special facilities for photometric, spectroscopic, and radiometric investigations.

The main building houses the offices for the staff, a lecture room, a spacious library, research laboratory, photographic dark rooms, and an instrument shop for the construction of special apparatus.

Members of the scientific staff of the Observatory are also members of the staff of the Department of Physics and Astronomy. The facilities of the Mendenhall Laboratory of Physics and the Emerson McMillin Observatory are available as far as possible to supplement the facilities of the Perkins Observatory, and the staff of the Mendenhall Laboratory of Physics cooperates fully with the staff of the Observatory in the supervision and direction of research. Unusual opportunities are thus offered for graduate and research work in astronomy and astrophysics.

(d) **With the Bureau of Juvenile Research of the State of Ohio.** Students who are registered in the Graduate School of The Ohio State University and who are candidates for a Master's degree, specializing in Clinical Psychology, may do not to exceed one-third of the work required for this degree at the Bureau of Juvenile Research. All such work must be approved in advance by a professional member of the Clinical Division of the Department of Psychology, and all credits received for such work must be submitted under his signature.

Candidates for the degree of Doctor of Philosophy specializing in Clinical Psychology, may likewise carry on work at the Bureau of Juvenile Research. The amount of such work shall be determined in each individual case by a professional member of the Division of Clinical Psychology of the Department of Psychology and the Dean of the Graduate School, but in no case will this amount exceed one-third of the total requirements for the degree of Doctor of Philosophy.

Students carrying work at the Bureau of Juvenile Research must be registered in the Graduate School of this University during the time in which they are pursuing such work.

The Bureau of Juvenile Research offers a limited number of full-time interneships for qualified graduate students majoring in clinical psychology.

(e) **With the Battelle Memorial Institute.** Students who are registered in the Graduate School of The Ohio State University, specializing in certain fields of engineering, especially in metallurgy, fuels and allied fields, may carry on their research work at the Battelle Memorial Institute. The credit for such work must be submitted under the signature of the professor in charge of the work, who must be a member of the appropriate department of the University.

(f) **With the Kettering Research Foundation.** The Ohio State University has entered into an agreement with the Kettering Research Foundation at Antioch College which makes it possible for candidates for the Ph.D. degree to carry out the research work essential for a dissertation at the Kettering Foundation. This work must be done under the general direction of the appropriate department in The Ohio State University.

The research work of the Kettering Foundation is directed largely to a study of chlorophyll and photosynthesis. Excellent opportunities are offered

to those interested in these and related fields of biophysics, biochemistry and plant physiology. Ample facilities and a competent scientific staff are available. Such a program of research, when offered as a dissertation, must meet both the requirements and the standards of The Ohio State University and the Kettering Foundation.

Students may obtain as much as two years of residence for research carried out at the Kettering Research Foundation. They must, however, register simultaneously in the Graduate School of The Ohio State University. During this period they are exempt from all fees except the matriculation fee of $15.00 and the graduation fee when the degree is received. At least one year of residence must be spent at The Ohio State University doing the course work necessary for the Ph.D. degree. During this year of residence, the regular incidental, laboratory and tuition fees must be paid, unless the student has been appointed to a Kettering Research Foundation Fellowship with a stipend of $300 or less per Quarter.

Students registering under this plan must obtain the approval of the department concerned, must have an appointment at the Kettering Research Foundation and meet all the requirements for the Ph.D. degree as imposed by The Ohio State University.

(g) With the Samuel S. Fels Institute for the Study of Prenatal and Postnatal Environment. A cooperative agreement between the Graduate School of The Ohio State University and The Samuel S. Fels Institute for the Study of Prenatal and Postnatal Environment at Antioch College permits graduate students to complete the dissertation, in whole or in part, at the Fels Institute.

The Fels Institute is engaged in an important investigation of the environment and hereditary factors controlling child development. A considerable number of research projects are under way. Cooperative relations have been established with other research laboratories and institutions. Excellent research opportunities are provided for those interested in this field of science.

Students may earn as much as two years of residence while carrying on research at Fels Institute. They must, however, register simultaneously in the Graduate School of The Ohio State University. During this period they are exempt from all fees except the matriculation fee of $15.00 and the graduation fee when the degree is received. At least one year of residence must be spent at The Ohio State University doing the course work necessary for the Ph.D. degree. During this year of residence the regular incidental, laboratory and tuition fees must be paid, unless the student has been appointed to a Fels Institute Fellowship with a stipend of $300 or less per Quarter.

Students registering under this plan must obtain the approval of the Department of Psychology, must hold an appointment with the Fels Institute, and must meet all the requirements for the Ph.D. degree as imposed by The Ohio State University.

INSTITUTE OF NUTRITION AND FOOD TECHNOLOGY

In order to mobilize existing facilities and personnel for research and graduate study in nutrition and food technology, The Ohio State University and the Ohio Agricultural Experiment Station have organized an Institute of Nutrition and Food Technology. The objectives of this institute are:

1. To promote cooperative research in nutrition and food technology;

2. To organize and integrate instructional programs to enable students to receive training for specialized careers in nutrition and/or food technology;

3. To mobilize the talents and facilities of The Ohio State University and the Ohio Agricultural Experiment Station in a coordinated program of education and research toward the broad objective of "better health through better nutrition" for the American people;

4. To receive grants-in-aid for researches in nutrition and food technology, these grants to be administered for the Institute through the Research Foundation, the Development Fund, or the Experiment Station.

The governing body of the Institute is an Administrative Board consisting of the Dean of the Graduate School, the Director of the Agricultural Experiment Station, and the Director of the Institute. This Administrative Board determines the policies of the Institute and recommends appointments to its staff.

The Staff of the Institute consists, in general, of those members of the Faculty of the Colleges of the University, and the Research Staff of the Ohio Agricultural Experiment Station who are qualified to contribute substantially to the Institute's program.

The subject matter areas participating in this program are quite diversified as the foregoing statements indicate. Students interested in nutrition and/or food technology will be expected to enroll in a department and meet the departmental requirements for the degree sought. In some instances it may be desirable for a student who wishes to become a candidate for the Ph.D. degree to elect an interdepartmental degree program. (See page 34.)

THE UNIVERSITY LIBRARY

The University Library consists of all books owned by the University and numbers over 705,240 volumes. The main part of the Library, which is known as the General Library, is housed in the Library Building. Very important divisions of the book collection are housed in other buildings. A catalog of the entire collection is maintained in the General Library.

Any person is privileged to use the University Library for reference, but books may be drawn for home use only by officers and registered students of the University. Graduate students may obtain a permit to use the stacks of the Library upon presentation of their fee cards at the office of the Librarian.

The University Library is a depository for the official publications of the United States and has a very complete collection of these documents. It also receives thousands of documents from states, cities, and foreign countries. The Library also possesses the British Parliamentary Papers including the rare early volumes. The numerous series of the publications of the League of Nations are well represented in the Library Collections. The exchanges of the Ohio Academy of Science, of the Ohio State University Scientific Association and of the Ohio Biological Survey are deposited in the University Library.

Through a gift from the Phi Eta Sigma fraternity, the General Library has established a rental library of significant current books for general reading. Its popularity suggests that this project fills a recognized need.

The University Library is a depository for the Library of Congress catalog.

Fourteen department libraries, organized divisions of the University Library, are in charge of library assistants.

The Botany and Zoology Library is located in the Botany and Zoology Building. The "Index to General Botanical Literature," the "Index to Algological Literature" and the card index to the Concilium Bibliographicum are in this departmental library.

Brown Hall Library, located in Brown Hall, contains collections of books on Architecture, Engineering Drawing, and Civil Engineering. The collection of plates filed in this library is especially valuable for students in Architecture.

The Charles Cutler Sharp Library is located in the Chemistry Building. It contains not only the current periodicals and a large collection of dictionaries and handbooks on chemistry, but also complete sets of all important journals dealing with subjects lying within the general field of chemistry and related sciences.

The Commerce Library, in the Commerce Building, includes a working collection of books for the undergraduate students in the College of Commerce. A large study room is maintained and also a reserve collection for student use.

The A. F. Davis Welding Library, in Room 200, Industrial Engineering Building, represents a bringing together from several sections of materials on welding in its various aspects. Through the courtesy of the James F. Lincoln Arc Welding Foundation the prize papers of the 1937-1938 and 1942 Award Program have been deposited in this collection as a contribution to research in the field. The centralization of books in mechanics and industrial engineering, with the books on welding, will make this collection a center for engineering research.

The Education Library is located in Arps Hall. It is organized for graduate work and includes complete sets of important educational and psychological periodicals, city and state reports, textbooks, and other works of reference on educational and psychological subjects.

The Law Library is in Page Hall. It includes all of the United States and state reports, the English reports, the Irish reports, the latest statutes, codes and session laws of the states, complete sets of all the important legal periodicals and an up-to-date collection of text-books. It is especially well equipped for the study of Ohio law.

The Lord Hall Library consists of collections of books on Ceramics, Mining, Metallurgy, and Mineralogy and is located in Lord Hall.

The Medical and Dental Library is in Hamilton Hall. It consists of a working collection of books and periodicals. The historical books and many of the foreign periodical sets are shelved in the General Library.

The Music Library is located on the first floor of Page Hall. It contains important collections of instrumental and choral music, records, orchestral and band scores, selected titles on the teaching and history of music, biographies of musicians and works on the appreciation of music.

The Orton Memorial Library, located in Orton Hall, is one of the finest geological libraries in the country. In addition, the Ohio Geological Survey deposits its document exchanges with the library. These two collections constitute a very complete set of official geological reports from the states, foreign governments, and scientific societies.

The Pharmacy-Bacteriology Library is located in the basement of the Pharmacy and Bacteriology Building. It comprises files of journals and selected titles in pharmacy and bacteriology designed to furnish a reference collection for the students in these departments.

The Alfred D. Cole Memorial Library of Physics occupies three rooms in the Mendenhall Laboratory of Physics. The nucleus of the collection is the private library of Professor Cole. This library now contains not only current periodicals and selected books in the field of physics and astronomy but also complete sets of all important periodicals which are devoted to physics and its applications. Books and periodicals in the field of mathematics and optics—the future Lionel Topaz Memorial Library of Visual Science—are also located in the Cole Memorial Library for the mutual convenience of the two departments. A memorial endowment fund contributed by the friends of Professor Cole provides for additions to this Library which cannot be secured from the regular Library funds for the maintenance of libraries.

The Social Administration Library is located on the fourth floor of the Social Administration Building. The library consists of texts, journals, serials, and particularly reports of Social Welfare Agencies selected from the University Collections and located in the Social Adminstration Library for the convenience of students and faculty in this field.

The Library of the College of Veterinary Medicine, located in the Veterinary Laboratory, contains approximately 2,000 volumes in this field, exclusive of a large collection of bulletins, reports, reprints, and other unbound and uncatalogued material.

Smaller collections selected with special reference to the needs of the various departments are housed near their offices. Collections of this type have been developed for Animal Husbandry in Plumb Hall and Journalism on the second floor of the Journalism Building. The books relating to the School of Fine and Applied Arts are collected in the Mantel Room in the General Library, where students have every facility for research. The collections of the College of Engineering are at present scattered among the buildings housing the offices of the various departments. Ceramic Engineering and Mine Engineering are in Lord Hall. Architecture, Civil Engineering, and Engineering Drawing are in Brown Hall. Chemical Engineering is in the Chemistry Building. Electrical Engineering and Mechanical Engineering are in Robinson Laboratory. Industrial Engineering, Mechanics, and the Davis Welding Library are in the Industrial Engineering Building. By reason of limitation of space in these office rooms, most of the sets of the Engineering periodicals with the exception of the most recent volumes, are shelved in the General Library or in the Stack Annex.

The Library of the Ohio Archaeological and Historical Society, which is on the University Campus, is at the service of the officers and students of the University. This library is specializing in the history of Ohio and the Northwest and a very valuable collection is being built up. Its large newspaper collection is one of the most valuable in the Middle West.

The special library of Battelle Memorial Institute and the collections of the State Library are open to faculty and students of the University and supplement in important fields the collections of the University Libraries.

THE STATE LIBRARY

The State Library, consisting of approximately 900,000 volumes, is also available and is especially valuable in certain lines of work.

TEACHERS' PLACEMENT SERVICE

The Ohio State University maintains a Teachers' Placement Service for the convenience of the superintendents and boards of education of the State. Graduates and graduate students of the University are invited to enroll with the Appointments Office.

The Placement Service is under the direction of the Bureau of Educational Research. This service is rendered free of charge to the applicants. Graduates of experience who desire to better their locations are invited to communicate with the Appointments Office.

The Appointments Office has available such statistical information that advice and direction may be given in the matter of supply and demand for teachers in various fields.

Superintendents and boards of education are invited to state their needs to the Appointments Office. Prompt attention to all calls is assured.

GRADUATE STUDENT LOANS

A limited amount of money is available for loans to graduate students upon application to the Dean of Women or the Dean of Men. Loans are made only to those students who have been in residence in The Ohio State University for at least one Quarter. The maximum amount loaned in any one year to an individual is $100.00.

Phi Delta Gamma, graduate women's sorority, has available a loan fund for graduate women. Applications must be made to the President of Phi Delta Gamma.

UNIVERSITY HEALTH SERVICE
Baker Hall, Southeast Wing

Medical Staff: Dr. J. W. Wilce, Director; Dr. M. F. Osborn, Dr. Theodore Allenbach, Dr. James A. Beer, Dr. Shirley Armstrong, Dr. Zena Vaile, Dr. Earl H. Ryan, Dr. William Palchanis, one occasional clinical assistant, two specialized occasional consultants, four nurses, and one technician.

Office Hours. When the University is in session, daily 8:30 to 12:00 and 1:00 to 4:30; Saturdays, 8:30 to 12:00. Emergency service, 12:00 to 1:00.

The objects of the University Health Service are:

(1) To protect, maintain, and improve the health of students; cooperation in and follow up of entrance examination; early diagnosis and control of all communicable conditions, in cooperation with other health agencies; individual health guidance, through personal conference; first aid and casual treatment of students on the campus; periodic health examinations for seniors, food-handlers, and special cases; consultant specialist service for certain cases; full cooperation with family physician, other physicians, and health agencies; centralized correlation of health agencies on the campus to best educational personnel ends; maintained emphasis on individual and group preventive medicine.

(2) To serve as the primary coordinating agency through centralized health records with university personnel officials in individual student health appraisal and health problems which involve the maintenance, discontinuance, or improvement of students' university relationships.

(3) To furnish a *limited degree* of hospitalization for observation, diagnosis, or treatment of emergency conditions, when in the judgment of University Health Service physicians or private physicians it is thought necessary.

Responsibility for hospital treatment or special hospital expense is not assumed by the University Health Service. The hospitalized student is under the medical or surgical care of the senior members of the hospital staff and may be charged a moderate fee for this service. The hospitalized student has choice of his staff or other physician.

STUDENT AUTOMOBILES

The University does not bar the use of automobiles by students. However, students can be given only very limited parking space on the campus, and the use of autos is discouraged. Unless the student drives a long distance to and from his home each day or is physically incapacitated, he does not need a car while attending the University. The cooperation of parents in this matter is earnestly desired.

Every student driving a car on the campus must register the car at the beginning of each Quarter at the Information Desk in the Administration Building. Any student who fails to register his car will be given a *double penalty* when cited to the traffic court for violation of the University rule. Registration of the car entitles the student to park *only* in areas set aside for student parking.

FEES AND EXPENSES

Registration is not complete until all fees have been paid. No student will have any privileges in the classes or laboratories until all fees and deposits are paid, except under special procedure authorized by the President.

Graduate students must register and pay their fees not later than the end of the first week of the Quarter. All graduate students who have not paid their

fees before 4 P. M. on Monday following the beginning of classes shall be assessed a penalty of $1.00 for each succeeding day or fraction thereof (with a maximum of $10.00) unless excused by the Registrar.

1. Matriculation fee (non-returnable)
   Required of every student on *first admission to the University* $15.00
2. Incidental fees
   Incidental fees do not vary with the number of courses taken
   Quarter fee for a resident of Ohio..... 20.00
   Quarter fee, including non-resident fee, for a non-resident of Ohio 70.00
3. Special fees
   (a) General Activities fee..... 5.00
   (b) Laboratory Breakage deposits—amounts vary with the course .....from 1.00 to 20.00
   Students are required to pay for all materials consumed in laboratory work. A laboratory deposit for each laboratory course must be made at the time of registration before the student may enter the laboratory. All laboratory supplies are sold to students at the Laboratory Supply Store, Chemistry Building, and charged against the deposits (See page 19). Instructors shall not permit a student to engage in laboratory work unless the student has shown a receipt from the Bursar for the deposit required in the course
   (c) Abstract fee
   The abstracts of Masters' theses and Ph.D. dissertations are published in the form of a journal at the end of each Quarter and a special fee for editing, printing, and binding these abstracts is required for each person receiving such a degree from this University. This fee must be paid not later than a date which is set by the Graduate School office for the deposit of the abstract and thesis
   Abstracts of Masters' theses..... 5.00
   Abstracts of Ph.D. dissertations..... 50.00
   (d) Binding fee for theses and dissertations
   A special binding fee must be paid to the Bursar of the University not later than a date which is set by the Graduate School office for the deposit of the abstract and thesis 2.50

NOTE: Checks for fees will be accepted by the University but only when the check is drawn for the exact amount of the fees. When such checks are not paid on presentation at bank, registration will be automatically cancelled and receipts given considered null and void.

NON-RESIDENTS

Every student who is not a legal resident of the State of Ohio is required to pay a non-resident fee of $50.00 each Quarter (or $25.00 each term of the Summer Quarter) of his residence in the University in addition to other University fees. The burden of registering under the proper residence is placed upon the student. If there is any possible question of his right to legal residence the matter should be brought to the attention of the Registrar and passed upon, previous to his registration or payment of fees. Any student who registers improperly under this rule shall be required to pay not only the non-resident fee but shall be assessed a penalty of $10.00. Students who do

not pay this fee within thirty days after they have been notified that the non-resident fee has been assessed against them, will have their registration in the University cancelled.

The rules are as follows:

1. No student shall be considered eligible to register in the University as a resident of the State of Ohio unless he has had a *bona fide* domicile in the State twelve consecutive months.

2. No student whose domicile was outside the State of Ohio in the year preceding his original enrollment in the University shall be considered a resident unless it can be clearly established by him, that his former domicile has been abandoned and a new domicile established in the State of Ohio and maintained for at least *twelve consecutive months.* No application for resident standing can be considered until the applicant is 22 years of age.

3. No student whose domicile was outside the State of Ohio at any time after his original enrollment in the University shall be considered a resident unless he has established his domicile as stated in paragraph 2.

4. MINORS. The domicile of a minor student shall be considered the same as that of his natural or legal guardian, if any, regardless of emancipation. If an Ohio resident is appointed guardian of a non-resident minor the latter shall be considered a non-resident until twelve months after such appointment.

5. WIVES. The legal residence of wives shall follow that of husbands.

6. The President will exercise his discretion as to the remission of non-resident fees in the cases of:

a. Children of members of the United States Army, Navy, or Marine Corps, and persons who are orphans or in somewhat similar status.

b. Non-resident minors for whom an Ohio resident has been appointed guardian.

c. Aliens.

ROOM AND BOARD

Room and Board. (See Living Arrangements, page 25.)

RETURN OF FEES ON WITHDRAWAL

Fees are returnable in case a student withdraws on account of sickness or for other causes entirely beyond his control, if such withdrawal is made during the first thirty days of the Quarter. Students withdrawing under request from the University are not entitled to any return of fees. Permission to withdraw, given in writing by the Dean of the College, must be presented to the Bursar within this thirty-day period. Ordinarily no more than one-half of the fees paid will be refunded; if the case has exceptional circumstances it should be referred to the President for his judgment.

No fees will be returned in case of withdrawal of students until thirty days have elapsed from the date of withdrawal.

If fees are paid under mistake of law or fact they are returnable in full

Fees are not returnable except as provided in this rule.

On Laboratory Deposits. If a student is forced to withdraw from a laboratory course during a Quarter, he must first secure permission from his Dean

No portion of a laboratory deposit of $5.00 or less shall be returned, unless the course is officially dropped by the student and request for refund presented within thirty days after the payment of the deposit.

On a laboratory deposit of $6.00 or more the unexpended part of the deposit is returnable if called for on or before the close of the Spring Quarter of the fiscal year in which the deposit has been made.

An order for refund for the unexpended portion of the deposit may be obtained by applying at the Laboratory Supply Store, Chemistry Building. The

unexpended part of the deposit will be paid at the Bursar's Office on presentation of the order for refund.

SPECIAL FEE—PENALTY

PENALTY FOR FAILURE TO KEEP APPOINTMENT FOR PHYSICAL EXAMINATION

A fee of $1.00 will be assessed for failure to keep appointment for Physical Examination or for change in date of Physical Examination.

STUDENT PERSONAL EXPENSE FUNDS

The incoming student will save himself much time and trouble by taking a few simple precautions in regard to his personal expense money. The student should bring enough cash to cover all expenses for several days. If he does not wish to carry cash, he should use travellers checks, as they are readily cashed. If he does bring a check, it should be in the form of a bank draft or cashier's check. The student who has a check should not wait until he has spent all his money before cashing the check for it may take several days to collect it. Be sure that any checks that are for the payment of fees are drawn for the exact amount of the fees.

The following facts concerning the cashing of checks should be borne in mind by parents and prospective students.

(a) The Ohio State University does not cash checks.

(b) Checks for fees will be accepted by the University, but only when the check is drawn for the exact amount of the fees.

(c) Banks do not cash checks for strangers unless the check is endorsed by a customer of the bank or some person of known responsibility. This rule applies to cashier's checks, bank drafts, and certified checks.

The student who intends to use a checking account will find that an account in Columbus will be of more value than an account at home or in some other city. An account with a Columbus bank will provide a safe place for depositing funds, will help create a local credit standing, will furnish a means of depositing and cashing checks, and will help the student to understand banking practices.

SCHOLARLY PUBLICATIONS

The Graduate Faculty is engaged both in teaching and research. The results of its scholarly activities ordinarily appear as research papers in appropriate journals or as scholarly monographs. In order to make the results of these investigations more available, the Graduate School publishes a series of monographs in different fields of learning. A manuscript is accepted for publication on the basis that it contains new and original work. In exceptional cases the results of research work done by graduate students may be accepted for publication as a monograph. These monographs are sold at cost and it is the established policy of the Graduate School to publish only important contributions to knowledge which would ordinarily not be accepted for publication on a commercial basis. The University Library uses these publications as a basis of exchange for publications from other universities. A complete list of those already published or in press can be had on application to the Office of the Graduate School.

ASSISTANTSHIPS, FELLOWSHIPS, AND SCHOLARSHIPS

GRADUATE ASSISTANTSHIPS OPEN TO GRADUATE STUDENTS

In order to encourage graduate students to continue their studies and to pursue advanced work leading to the higher degrees, the University has established graduate assistantships in several departments. Graduate assistants

must be registered in the Graduate School as candidates for a graduate degree. They are elected for the year—four Quarters. During three Quarters, generally the Autumn, Winter, and Spring Quarters, they must devote approximately one-third of their time to assisting in the work of the department in which they are specializing; during the remaining Quarter the graduate assistants are free to carry on their work at the University or elsewhere. Each graduate assistant must confer with the chairman of the department in which he is specializing concerning the Quarters that he must be in residence. A graduate assistant receives a stipend of $600 to $810, payable in nine monthly installments during the three Quarters in which he is rendering service. In addition, all fees are remitted except a matriculation fee of $15.00. If a graduate degree is obtained, the assistant must pay a fee for editing and printing the abstract of his thesis or dissertation and for binding the thesis or dissertation ($7.50 in the case of the Master's degree and $52.50 in the case of the degree of Doctor of Philosophy).

Students desiring to apply for graduate assistantships in any academic year *must present their applications not later than March 1 of the preceding year.* Application blanks may be obtained upon request by addressing the chairman of the department in which the candidate desires to secure such an assistantship.

UNIVERSITY SCHOLARSHIPS AND FELLOWSHIPS

In addition to the graduate assistantships, a limited number of scholarships and fellowships have also been established. The scholarships are open to students having a baccalaureate degree from an approved institution, and have a value of $300 to $400 with exemption from all fees, except the matriculation fee of $15.00. The fellowships, on the other hand, are open only to students who have at least the Master's degree or its equivalent, and have a value of $600 with like exemption from all fees, except the matriculation fee. (This exemption from fees amounts to $72.00 for residents of Ohio and $222 for non-residents of Ohio for the academic year.) If a graduate degree is obtained, a scholar or a fellow must pay a fee for editing and printing the abstract of his thesis or dissertation and for binding the thesis or disseration ($7.50 in the case of the Master's degree and $52.50 in the case of the degree of Doctor of Philosophy). These awards are limited to applicants under thirty-five years of age.

Scholars and fellows are selected on a basis of merit, irrespective of the departments in which they wish to specialize, and *must devote all their time to graduate work, including research.* They are elected for the year, four Quarters, but are required to be in attendance only three Quarters, generally the Autumn, Winter, and Spring Quarters, during the year. Candidates for these positions for the year 1947-1948 must file their applications not later than February 15, 1947. Application blanks may be obtained by addressing the Dean of the Graduate School. Appointments are made annually on April 1 in accordance with the regulations of the Association of American Universities, of which Association the University is a member.

NON-RESIDENT TUITION SCHOLARSHIPS

Each year the Graduate School offers fifty non-resident tuition scholarships, available to graduate students who are not residents of Ohio. These scholarships provide for the remission of the non-resident tuition fee of $50.00 a Quarter and, therefore, carry a stipend which is equivalent to $150 a year. The regular incidental fees must be paid just as though the student were a resident of Ohio. These scholarships are awarded only to students of outstanding ability. Applications should be accompanied by a transcript of record of undergraduate and graduate work (if any), letters of recommendation from those familiar with the applicant's work and any other available evidences of ability

and achievement. Candidates for these non-resident tuition scholarships should apply to the Dean of the Graduate School for application forms and submit them not later than February 15.

THE FREDERICK HILLIS LUMLEY MEMORIAL

Mr. and Mrs. Frederick E. Lumley, in memory of their son, have created the Frederick Hillis Lumley Memorial Fund in experimental and theoretical psychology. From the income of this fund a fellowship or scholarship in experimental or theoretical psychology will be created by the committee in charge of the fund; or at the discretion of this committee, the income from the fund may be spent for publication of work done at The Ohio State University in the fields mentioned above, or for such other aid in furthering important research in the field as the committee may approve.

ENDOWED FELLOWSHIPS

THE ELIZABETH CLAY HOWALD SCHOLARSHIP

This scholarship, endowed by the late Ferdinand Howald, an alumnus of The Ohio State University, in memory of his mother, Elizabeth Clay Howald, carries a stipend of $3,000 payable in twelve monthly installments.

Any person who has shown marked ability in some field of study and has in progress work, the results of which promise to constitute important additions to our knowledge, shall be deemed eligible to appointment to this Scholarship.

The scholar will be expected to devote his time uninterruptedly to the pursuit of his investigations. If he has ever been a student of The Ohio State University or a member of the University staff, he may carry on his investigations either at The Ohio State University or, subject to the approval of the Graduate Council, elsewhere either in this country or abroad where superior advantages for his particular field of study are available. If the scholar has never had any connection with The Ohio State University, however, then he must carry on his investigations at The Ohio State University.

Applications must be filed with the Dean of the Graduate School not later than March 1. The appointment will be made in April and the term of appointment will begin July 1 and extend to July 1.

Prospective candidates may secure application blanks by addressing the Dean of the Graduate School.

THE MARY S. MUELLHAUPT SCHOLARSHIPS

These scholarships, which were endowed by the late Mrs. Mary S. Muellhaupt of Portland, Oregon, are granted annually to the candidates who are considered most likely to promote, by original research, one of the biological sciences, particularly botany, bacteriology, physiology and zoology. They carry stipends of $1,400 to $1,800 each.

Anyone who has recently completed the requirements for the Ph.D. degree or who has training equivalent to this degree, as shown by publications, shall be eligible for appointment to these scholarships.

The holders of these scholarships must devote their entire time to research for a period of one calendar year from the date of appointment with one month for vacation.

Applications should be accompanied by publications and other supporting evidence of research experience, as well as a plan of the research proposed under the scholarship. They must be filed with the Dean of the Graduate School not later than March 1.

Prospective candidates may secure application blanks by addressing the Dean of the Graduate School.

THE STILLMAN W. ROBINSON FELLOWSHIP

The fellowship endowed by Stillman W. Robinson, late Professor of Mechanical Engineering, for the encouragement of graduate research in engi-

neering, has an annual value of $750, and is open to graduates in Mechanical, Civil, and Electrical Engineering.

The holder of the fellowship must devote his entire time to graduate work. This should lead to the Master's or the Doctor's degree under the general regulations which obtain in reference to these degrees. For further information, or for application blanks, address the Dean of the Graduate School or the Secretary of the College of Engineering.

All applications should be filed with the Dean of the Graduate School not later than February 15.

THE NATHANIEL WRIGHT LORD FELLOWSHIP

The fellowship endowed by William Bartlett Calkins, an alumnus of the University, in memory of Nathaniel Wright Lord, late Professor of Metallurgy, has an annual value of $750. This fellowship was established to encourage graduate research on solid fuels or products derived from solid fuels which have a practical application in the industrial world.

The holder of the fellowship must devote his entire time to graduate work. This should lead to the degree of Master of Science or Doctor of Philosophy, under the general regulations which obtain in reference to these degrees. For further information or for application blanks address the Dean of the Graduate School.

All applications should be filed with the Dean of the Graduate School not later than February 15.

EDWARD ORTON JUNIOR CERAMIC FOUNDATION FELLOWSHIP

Under the provisions of the will of the late Edward Orton, Jr., the Edward Orton Junior Ceramic Foundation has established a fellowship having an annual value of $750. Of this amount $600 is the stipend of the Fellow and $150 is used for the purchase of apparatus and materials. The holders of these fellowships are expected to devote their entire time to graduate courses and research work in the field of ceramics under the general direction of the Department of Ceramic Engineering and ordinarily will be candidates for either the Master of Science or the Doctor of Philosophy degree.

THE JOHN A. BOWNOCKER FELLOWSHIP AND SCHOLARSHIPS

A fellowship and one or more scholarships may be provided from funds bequeathed by John A. Bownocker, an alumnus of the University and late Professor of Geology. The fellowship has an annual value of $750 and a scholarship has an annual value of $450. Both Bownocker Fellowships and Scholarships carry the same exemption from fees as do the University Fellowships and Scholarships. (See page 21.) Applicants must have had at least one year of graduate work.

The holder of a John A. Bownocker Fellowship or Scholarship must register in the Graduate School of The Ohio State University and must devote his entire time to graduate work and research in the field of geology. This should lead towards the degree of Doctor of Philosophy under the general regulations which obtain in reference to this degree. For further information, or for application blanks, address the Dean of the Graduate School.

All applications must be filed with the Dean of the Graduate School not later than March 1. Appointments will be made April 1.

SPECIAL FELLOWSHIPS AND SCHOLARSHIPS

THE BATTELLE MEMORIAL INSTITUTE FELLOWSHIPS

The Battelle Memorial Institute of Columbus has established one or more fellowships at The Ohio State University. Each fellowship carries an honorarium of $1000 to $1200 for a twelve month period. All course work selected by the fellow will be taken at The Ohio State University, while the re-

search work will be carried on at The Battelle Memorial Institute. Inasmuch as this institute was founded for the purpose of studying the application of science to industries, especially in Metallurgy, Fuels and allied fields, the candidate's research work must be in this general field. Ordinarily each fellow will be a candidate either for the degree of Master of Science or Doctor of Philosophy, and will devote his entire time to graduate work, including research.

Candidates may secure application blanks by addressing the Dean of the Graduate School. All applications should be received not later than March 1 of each academic year.

THE MARGARET G. HARDER PAN-AMERICAN SCHOLARSHIP

In May, 1930, the Ohio Federation of Women's Clubs established a scholarship to be known as the Margaret G. Harder Pan-American Scholarship. This scholarship carries an honorarium of $800 payable in monthly installments, and in addition the holder of the scholarship is allowed the same exemption of fees as are the University Scholars and Fellows.

The scholarship is open to women graduates of reputable South American Colleges and Universities. For further information concerning this scholarship address Mrs. William N. Harder, 434 East Church Street, Marion, Ohio.

THE J. T. BAKER CHEMICAL COMPANY FELLOWSHIP

This Fellowship is devoted to fundamental research in Inorganic Analytical Chemistry. It is limited to institutions which grant the doctor's degree in chemistry in the states of Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, and Wisconsin, and is awarded annually to some institution which has been conducting research in Inorganic Analytical Chemistry. The stipend of the Fellow is $1,000. The holder of this Fellowship is not exempt from fees. Candidates may secure application blanks by addressing the Dean of the Graduate School. Applications should be filed not later than March 1.

THE PROCTER AND GAMBLE FELLOWSHIP

This Fellowship, established by the Procter and Gamble Company, has an annual value of $950. This fellowship was established to encourage graduate work in the field of Chemical Engineering and is open to graduate students in the Department of Chemical Engineering. The holder of this Fellowship must devote his entire time to graduate work leading to the degree of Doctor of Philosophy. The holder of this Fellowship is allowed the same exemption from fees as are the University Fellows and Scholars. Candidates may secure application blanks by addressing the Dean of the Graduate School. Applications should be filed not later than March 1.

PURE HYDROCARBON RESEARCH FELLOWSHIPS

These Fellowships are made possible by a program of research on pure hydrocarbons supported by interested companies in the automotive and petroleum industries and sponsored by the American Petroleum Institute through the Industrial Research Foundation. They are limited to graduate students who have completed one year of graduate work and have passed their divisional examinations for the Ph.D. degree. The fellow will be required to devote one-half of his time to the work of the Pure Hydrocarbon Research Program and his own research interest should be in the same or a closely allied field. The stipend is $550 for second year graduate students, and the appointment for a period of eleven months. Fellows are eligible for reappointment at $660 a year, subject to satisfactory service. Applications should be filed not later than June 1.

POST-DOCTORATE FELLOWSHIPS

E. I. du PONT de NEMOURS AND COMPANY POST-DOCTORATE FELLOWSHIP

The E. I. du Pont de Nemours and Company of Wilmington, Delaware, has established a post-doctorate fellowship for research in the field of cellulose chemistry. All applicants must hold the degree of Doctor of Philosophy. The stipend is $2,000 for the year. Applications must be filed with the Chairman of the Department of Chemistry.

SPECIAL PRIVILEGES TO DOCTORS OF PHILOSOPHY AND OF SCIENCE

The privilege of attending lectures and seminars and of carrying on research in the laboratories and libraries is extended by the President of the University, on the recommendation of the chairman of a department to doctors of philosophy or doctors of science or to scholars with an established reputation. Such visiting scholars may not take courses for credit but are expected to devote their time to some form of scholarly work. There will be no charge except for laboratory supplies. Those desiring to avail themselves of this privilege should correspond with the chairman of the department in which they are interested and with the President before the opening of the Quarter in which they desire to be in residence at the University.

OTHER FELLOWSHIPS

A number of fellowships are established each year by various organizations and societies for one year only, for the purpose of carrying on research work in definite fields of investigation.

WOMEN GRADUATE RESIDENTS

Several women students will receive stipends of from $20.00 to $60.00 a month for nine months of the year and room and board as Graduate Residents in Women's Residence Halls. In return they give twenty-five hours a week to duties under the direction of the Head Resident. They pay their own tuition and other fees. They cannot take any additional paid work. More detailed information will be furnished on request.

One Graduate Resident in the W.S.G.A. Cooperative Club has the opportunity to materially reduce her room and board expenses by taking part in this cooperatively-operated residence for upper division students.

Upon application from any sorority, the Board of Trustees will grant free tuition to Graduate Residents for whom the sorority offers a fellowship covering room and board. In return the Graduate Resident cooperates with the Dean of Women in helping the members of the sorority as an older adviser.

Applications for all of the above three kinds of positions should be made before April 1.

LIVING ARRANGEMENTS

The President of the University has the authority to supervise living arrangements of students not residents of the city of Columbus and to order the immediate withdrawal of any student from any boarding or lodging house in which the surroundings are undesirable.

ROOMS AND BOARD FOR MEN

Furnished rooms can be obtained at prices varying from $14.00 to $20.00 a month (single) and $20.00 to $35.00 (double). The cost of the table board in the clubs and restaurants near the University is from $6.00 to $8.00 a week. Board can be secured at Pomerene Hall and the Ohio Union at reasonable prices.

Board is available on a quarterly basis for both men and women students in Neil, Canfield, and Mack Halls, all of which are occupied by women at present. Applications may be obtained by writing to the Food Director's Office at Mack Hall.

The Stadium Dormitories provide low cost, barracks type housing for 420 men. Apply directly to the office of the Dean of Men, 108 Administration Building.

MEN'S HOUSING

We are dependent almost entirely upon the city of Columbus for the housing of men students. With a large increase in the city's population available rooms are very scarce. The University has taken over a portion of the Columbus Naval Air Facility and provides bus service to and from the campus. Veterans only may be accommodated. Applications may be had from the Dean of Men. The Office of the Dean of Men lists each day whatever rooms are available, but can give you no assurance of accommodations. We would advise you to visit Columbus three to four weeks in advance of the opening of the quarter you expect to enter, to see for yourself what is available.

MARRIED STUDENTS

The admission policy of the University is to give first preference to veterans from Ohio. Because we are dependent upon the community for the housing of married couples and because there are far too few accommodations for married students from Ohio, *we can offer no assistance to out-of-state students.*

THE GEORGE WELLS KNIGHT INTERNATIONAL HOUSE

The George Wells Knight International House, 104 Fifteenth Avenue, under the supervision of a board of trustees made up of Columbus men, offers desirable living quarters to foreign and a limited number of American students. Rates for rooms are from $33.00 to $39.00 a Quarter, according to the kind of room selected.

MEN'S FRATERNITIES

A large number of men enjoy the advantages of living together in fraternity homes. These Greek letter organizations have for many years maintained establishments which provide excellent rooming and boarding arrangements. They meet the same standards of inspection that are required of the approved houses and are approved as an integral part of the University's housing arrangements. Prospective students who are interested in possible membership should write to the Dean of Men.

WOMEN STUDENTS

The Ohio State University is open to women upon the same conditions and by the same methods of registration offered to men. Every woman student, whether undergraduate or graduate, must register with the Dean of Women at her office in Pomerene Hall during the first week of each Quarter. The exact dates of registration will be announced each Quarter.

LIVING ARRANGEMENTS FOR WOMEN

All living arrangements for women are under the supervision of the Dean of Women. Women students should apply to the Dean of Women for housing accommodations when making application for admission to the University.

After September 10, 1946, housing cannot be arranged by correspondence. Students must consult with the Dean of Women or her assistant in person for housing accommodations.

OTHER ARRANGEMENTS

A limited list of rooms in private homes is available for graduate women at the Office of the Dean of Women. There are also a very few light housekeeping rooms and apartments reported to the Dean of Women and available for the inspection of graduate women. Graduate women are not permitted to live in any house where there are men roomers.

FOR FURTHER DETAILED INFORMATION

Booklets and other sources of information about the various kinds of living quarters will be gladly and promptly sent to any one who inquires. Such information will include detailed descriptions of the halls of residence and houses as well as prices for the various types of accommodation. Address requests for booklets to The Dean of Women, Pomerene Hall, The Ohio State University, Columbus 10, Ohio.

ADMISSION

METHOD OF ADMISSION

The admission of students is in charge of the University Entrance Board, which determines the credits that shall be issued on all entrance examinations and certificates, and furnishes all desired information to applicants. Correspondence relating to admission should be addressed to the University Examiner, The Ohio State University, Columbus 10, Ohio.

ADMISSION OF OUT-OF-STATE STUDENTS

We cannot promise admission of all non-resident students who wish to enter. Future enrollments must necessarily determine this policy. Letters of inquiry should be addressed to the University Examiner, The Ohio State University, Columbus 10, Ohio.

REQUIREMENTS FOR ADMISSION

Admission to the Graduate School is open to all graduates of The Ohio State University as well as to the graduates of all other colleges and universities of approved standing, *provided their undergraduate records are satisfactory.* For an undergraduate record to be satisfactory in the sense of qualification for admission to the Graduate School it must show, in addition to a better than average record in general education, a superior academic record in the field of specialization in which the student desires to major in the Graduate School. Before entering upon graduate work in any department, the applicant must present evidence to the effect that he has had the necessary prerequisite training that will enable him to pursue with profit the courses desired. *It must be remembered also that admission to the Graduate School does not imply admission to candidacy for the degree.* No graduate student, not even one who is a graduate of The Ohio State University, is admitted to candidacy for a degree until he has been in residence a sufficient time to enable his instructors to judge of his ability to carry on graduate work.

Information concerning admission to candidacy will be found under the headings "Requirements for the Degrees of Master of Arts and Master of Science" and "Requirements for the Degree of Doctor of Philosophy."

Students who find it necessary to make up deficiences of any kind by taking non-credit courses may not register, in any Quarter, for more Quarter hours in non-credit courses than in courses for which they expect to receive graduate credit.

GRADUATE RECORD EXAMINATIONS

In addition to presenting a transcript of record of undergraduate and previous graduate work, each applicant for admission must take the Graduate Record Examinations. These examinations, which require no special preparation, give valuable evidence of a student's qualifications for graduate work; afford a convenient and effective method of presenting evidence of independent study or exceptional achievement and are very helpful in planning courses of graduate study. Students who have not taken them prior to admission, must do so during the first Quarter of residence. For information about them, write to the Graduate Record Examination, 437 West 59th Street, New York, N. Y. A small fee of $3.00 is charged.

Graduate students are classified in two groups as follows:

Regular Graduate Students. Students in this group are those who wish to work toward a graduate degree at The Ohio State University. A program of study will be outlined for a regular graduate student at the time of his first registration in the Graduate School. After consultation with an adviser or a departmental committee on graduate study, the status of regular graduate students will be determined as completely as possible and conditions for candidacy for the appropriate degree will be specified.

Special Graduate Students. Students in this group are those who do not expect to work toward an advanced degree but wish to elect work with a special purpose in view. Such students must comply with all the regular requirements for admission to the Graduate School. Their courses of study may be arranged with maximum freedom. Any course announced for advanced undergraduate students and for graduate students is open for election by a Special Student under the same conditions as those imposed upon students who are candidates for degrees.

Should a Special Student subsequently desire to become a candidate for a degree, the amount of credit he is to receive for work already completed will be determined by the department in which he expects to specialize and he must satisfy all the departmental requirements necessary for admission for the degree he seeks.

VETERANS

The United States Veterans Administration has approved the Ohio State University as an institution for training under Public Law 16 — Vocational Rehabilitation Act and Public Law 346 — the Servicemen's Readjustment Act of 1944 (G.I. Bill of Rights). The University, accordingly, encourages the enrollment of demobilized students and offers its facilities to those qualified for attendance to the full extent of its accommodations in each of its colleges and schools. The rules for admission and continued registration for demobilized students are, in general, the same as those for other students.

The district office of the Veterans Administration located at Dayton, Ohio, has charge of training in Columbus and that office should be contacted concerning assignment to the Ohio State University for vocational rehabilitation.

Veterans who have been approved for a period of training under the provisions of the G.I. Bill of Rights, should complete their admission and arrange for their schedules in the college of their choice in the manner outlined in this bulletin. Upon receipt of the approved schedule and fee card, these cards, together with the letter of authority for training issued by the Veterans Administration should be presented to the Veterans' Liaison Representative in Room 102, Administration Building. That official will enroll the student as a trainee and issue an identification card for the student to take to Room 104, Administration Building, where the payment of fees and the issue of books and supplies will be arranged. The Liaison Representative will notify the

Veterans Administrator of the commencement training in order that checks covering the subsistence allowance may be sent to the student at his Columbus address.

METHOD OF PROCEDURE FOR ADMISSION

An applicant for admission to the Graduate School must first secure a statement from the registrar or other officer of the university or college of which he is a graduate, which contains the following information: (1) the date of graduation of the applicant; (2) the degree received; (3) a complete list of courses taken and grades received. This transcript, together with a catalogue of the institution of which the applicant is a graduate, should be sent to the University Entrance Board not later than three weeks (an earlier date is preferable) before the opening of the Quarter in which the applicant expects to register. If the credentials are satisfactory, an admission card to the Graduate School will be mailed promptly to the applicant. If the credentials are not satisfactory or if further information is desired, the applicant will be notified at once by correspondence.

In case the applicant finds it impossible to send by mail the statement referred to in the preceding paragraph, he may present it in person when he reports for registration and receive his admission card. However, the office of the Entrance Board is always crowded on the opening days of the Quarters, so that the applicant will find it greatly to his advantage to secure his admission card in advance by correspondence.

METHOD OF PROCEDURE FOR REGISTRATION

The method of procedure for registration is as follows: The student, having secured from the University Entrance Board his admission card to the Graduate School, will present this card at the Office of the Graduate School in Room 309, Administration Building. Here he will be given a course of study card and will be instructed as to the further method of procedure for registration. This procedure will include the appointment of an adviser who will assist the student in mapping out, and entering upon the course of study card, a suitable course of study. The adviser will signify his approval of the course of study by signing the card in the appropriate place. The courses having been entered upon the course of study card, the student will then return the card to the office of the Graduate School and will have his schedule card properly filled out and approved. The student will then immediately report to the Registrar's office in the Administration Building and obtain his fee card. He will then pay his fees at the office of the Bursar in the Administration Building. *Registration is not complete until the fees have been paid.* Even a student who for any reason is exempt from the payment of fees, must report to the Bursar's office and have his fee card stamped. All fees and laboratory deposits required by a student must be paid to the Bursar before the student is entitled to enter his classes.

No student is permitted to change his adviser without the approval of the Dean of the Graduate School.

CHANGES IN COURSE

After a student's election card has been made out, changes in his course of study will be made only upon the written request of the student's adviser. No credit will be given on the University records for courses taken without the proper authorization.

DATE OF REGISTRATION

Registration for any Quarter is permissible at any time during the three-weeks period previous to the opening day of the Quarter. If it is at all possible a student should register sometime during this period. However, students from

out of town should write for an appointment before coming to register *during the vacation periods between Quarters* since it is not possible to register without the approval of the department in which the student is specializing. Students who find it impossible to register before the opening day of the Quarter will be allowed to register during the first week of the Quarter *only*.

A student who is exempt from the payment of fees under the regulations of the Board of Trustees must complete his registration promptly in order to obtain such exemption.

AUDITING COURSES

Regularly registered students may audit courses with the written permission of the instructor in charge of the course or courses. Such courses must be officially entered upon the schedule of the student. Cards for this purpose may be obtained from the office of the Graduate School during the first two weeks of the Quarter only.

WITHDRAWAL FROM COURSES

After registration is completed, the student must report at the office of the Graduate School in order to withdraw officially from any course; otherwise he will be marked "Failed" in the course from which he withdraws. After the middle of the Quarter, the instructor's written permission is necessary before withdrawal from a course will be permitted. Withdrawal from courses will not be permitted after two weeks prior to the beginning of final examinations.

STUDENTS TRANSFERRING TO A COLLEGE IN THE UNIVERSITY

A student who desires to transfer from the Graduate School to a college of this University must make his application for such transfer to the University Examiner. This transfer must be approved by the University Examiner before the student will be permitted to proceed with his registration in the college which he is proposing to enter.

WITHDRAWAL FROM THE UNIVERSITY

A student who desires to withdraw from the University must apply to the Dean of the Graduate School for permission to withdraw in good standing. *If the student leaves the University at any time during the Quarter, without communicating with the Dean, he will be marked as having failed in all of his courses for the Quarter.* If a personal interview is impossible, the Dean must be notified by mail. In order to retain his right to voluntary return, the reasons given for withdrawal must be satisfactory to the Dean, and must be so endorsed at the time the application is filed. After the middle of the Quarter the student must obtain written permission from the instructors in charge of his courses before he may withdraw. No withdrawal from the University will be permitted after two weeks prior to the beginning of final examinations.

The written permission of the Dean shall be filed with the Registrar at once by the student in order that the proper entry may be made upon the University records.

COMBINATION ARTS AND SCIENCES-GRADUATE COURSE LEADING TO THE TWO DEGREES, BACHELOR OF ARTS AND MASTER OF ARTS

In accordance with an agreement made between the College of Arts and Sciences and the Graduate School, it is possible for students of exceptional ability to secure both the Bachelor of Arts and Master of Arts degrees by an extra Quarter of study in addition to the regular four-year period ordinarily required for the degree of Bachelor of Arts. Indeed, by the proper planning of the sophomore and junior schedule of study, it is even possible to secure both of these degrees in four years.

Admission to the Combination Arts and Sciences-Graduate course is limited to those students in the College of Arts and Sciences who have completed all junior division requirements and at least one hundred and forty-five Quarter hours of work with a point ratio of not less than 3.5.

Students who are eligible and wish to apply for admission to this combination course must do so as soon as they have finished the junior requirements. Such students should report to the office of the College of Arts and Sciences or to the Graduate School for detailed information as to method of procedure.

COMBINATION ENGINEERING-GRADUATE COURSE LEADING TO THE BACCALAUREATE DEGREE IN ENGINEERING AND THE MASTER OF SCIENCE DEGREE IN FIVE YEARS

In accordance with an agreement made between the College of Engineering and the Graduate School, it is possible for qualified students in engineering to secure both a baccalaureate degree in engineering and a master's degree in five years.

An engineering student registered in the five-year curriculum whose general point average is 2.5 at the end of his third year may, upon his own application, be admitted to the master's degree program. A student so admitted may take approximately fifteen hours of his graduate program in the fourth year on senior petition. He must maintain double registration in the College of Engineering and the Graduate School during the fifth year. During the fifth year he must complete the remainder (approximately thirty Quarter hours) of his program for the master's degree, meeting all the graduate requirements for that degree. Not less than fifteen Quarter hours, including thesis, must be taken in courses open only to graduate students.

In order for a student to be admitted to the Graduate School at the beginning of the fifth year, he must satisfy the normal requirements for such admission.

CREDIT TOWARDS A MASTER'S DEGREE FOR COURSES REQUIRED FOR THE PROFESSIONAL DEGREES IN THE COLLEGE OF DENTISTRY, THE COLLEGE OF LAW, AND THE COLLEGE OF MEDICINE

Students admitted by the University Examiner to both the Graduate School and either the College of Dentistry, the College of Law, or the College of Medicine may offer not to exceed 15 Quarter hours of work required for either the D.D.S., LL.B., or M.D. degree towards the Master's degree, or 45 Quarter hours towards the Ph.D. degree, this number to include the 15 Quarter hours already allowed for the Master's degree. No student who has an average of less than "B" in courses taken in the field of specialization is eligible to double registration. To register in this double curriculum the candidate must first secure an admission card from the University Examiner. This admission card must be presented at the office of the Graduate School where a course card will be made out for him. He must then present the same to an adviser who will be appointed in the department in which he wishes to major for the graduate degree. The adviser, after consultation with the candidate, will map out the course proposed for the Master's or the Ph.D. degree, which may include the number of Quarter hours of Medical, Law, or Dental work referred to above, and sign the card, thus indicating his approval of the course. The candidate will then return the card to the office of the Graduate School. If the course so selected meets with the approval of the Dean of the Graduate School, the candidate will be registered in the Graduate School as well as in the appropriate professional college. In order to secure such double credit the candidate must

be registered in the Graduate School during the Quarter in which the work is taken and must receive a grade of "B" or better in the courses required for the Law, Medical, or Dental degree.

DEGREES CONFERRED

The following higher degrees are conferred by the University: Master of Arts, Master of Science, Master of Business Administration, Master of Arts in Social Administration, Master of Science in Public Administration, Master of Science in Pharmacy, Master of Dental Science, Master of Medical Science, Doctor of Philosophy. The requirements for the Master's degree will be found on pages 35 to 42 and for the degree of Doctor of Philosophy on pages 42 to 45. All candidates must read these requirements carefully.

REGISTRATION DURING THE QUARTER IN WHICH THE DEGREE IS SOUGHT

A candidate for any graduate degree must be registered in the Graduate School during the Quarter in which he expects to come up for the degree.

GRADING SYSTEM FOR GRADUATE STUDENTS

The work of all graduate students performed in connection with the development of theses and dissertations is reported simply as "Prog" indicating progress until the work is completed when a grade of "Satisfactory" will be reported. All other work is reported as "A" Excellent, "B" Good, "C" Average, "D" Poor, "E" Failed, "E abs." Failed Absent.

A graduate student doing acceptable work must maintain a "B" average in all work included in the course of study outlined for the Master's degree with no more than one-third of the grades "C."

Any student whose record is deficient under this plan cannot continue as a candidate for an advanced degree except by special action of the Executive Committee of the Graduate Council, on request of the adviser in charge of the candidate's work.

Occasionally, for various reasons, a graduate student may receive a grade of "Incomplete" in a course with the privilege of finishing the work later on. In all such cases, however, this "Incomplete" must be made up not later than the end of the first Quarter of registration after the close of the Quarter in which the "Incomplete" was received, or no credit will be allowed for the course.

A student who receives one or more "Incomplete" grades during a Quarter must reduce his schedule for the following Quarter by the number of hours "Incomplete" received.

A graduate student who is registered in a "600" or "700" course carrying graduate credit must receive a grade of "B" or better in such a course in order that it may count toward any graduate degree and such student is required to complete special work designed to meet the requirements for graduate courses.

TOTAL CREDIT THAT MAY BE RECEIVED IN ANY ONE QUARTER

A graduate degree stands for concentration in a limited field of study. *No graduate student may receive credit toward a graduate degree for more than fifteen hours in any one Quarter or more than eight hours of graduate credit for work taken during a term of one Summer Quarter.*

CREDIT HOURS FOR PART-TIME ASSISTANTS AND INSTRUCTORS

The maximum credit toward a graduate degree that may be obtained in any one Quarter (a) by a graduate assistant is twelve hours, (b) by an assistant, ten hours, and (c) by an instructor, eight hours. The maximum credit that may be obtained by students holding positions other than those named above will be decided in each case by the Dean of the Graduate School.

SENIORS TAKING COURSES FOR GRADUATE CREDIT

A senior whose full time is not required for the completion of the work for his baccalaureate degree may select certain courses for graduate credit, *but to do this permission must be obtained at the office of the Graduate School (Room 309, Administration Building) before registering for the courses.* A grade of "B" or better must be received in order to obtain graduate credit. Not more than fifteen Quarter hours of such work may be counted towards an advanced degree.

GRADUATE WORK IN THE SUMMER QUARTER

Candidates for the Master's degree may complete the residence requirement for such a degree by pursuing graduate work at the University for three full Quarters. For the benefit of those who cannot always stay during the entire Summer Quarter, this Quarter is divided into two equal terms. At least one continuous Quarter of residence must be included in the residence requirement of one year for this degree. The remaining work for the degree may be taken in four Summer Terms or by registration during Summer Terms and the completion of a certain amount of satisfactory *ad interim* work under the direction of one or more members of the instructional staff of the department in which the student is specializing. *Ad interim* work must be taken between Summer Terms or Quarters and no student may receive the Master's degree during a Quarter in which he is registered for *ad interim* work. The amount of such work that will be credited towards any advanced degree is limited to fifteen Quarter-hours and the amount during any one *ad interim* period to eight Quarter-hours.

No student is allowed to pursue *ad interim* work unless he has been in residence in the Graduate School of this University at least one term of a Quarter. Moreover, it is optional with any member of the instructional force as to whether or not he will conduct such work.

A student who wishes to pursue *ad interim* work will proceed as follows: Before the close of the Summer term in which he is in residence he will obtain from the office of the Graduate School an appropriate card and, after consultation with the professor in charge of the proposed *ad interim* work, will enter upon this card a brief outline of the work to be pursued in the *ad interim* period. After securing the signature of the professor thus signifying his willingness to conduct the proposed *ad interim* work, the student must deposit this card in the office of the Graduate School *before* the close of the Summer Quarter. As an evidence of earnest intentions, he must also register in the University (this does not imply attendance) for at least one Quarter of each period during which the *ad interim* work is being pursued. He is also required to report to the professor conducting his work at least once a month and to pass such examinations as may be prescribed. He may borrow from the University Library such books as may be necessary for the successful conduct of the work, but will be required to pay for the cost of shipment. Requests for such books should be sent to the Dean of the Graduate School.

OFF-CAMPUS RESEARCH WORK

A student employed outside Columbus who desires to carry on off-campus research work in connection with his thesis or dissertation must have his program approved in advance by the appropriate department and by the Dean of the Graduate School, must maintain his registration in the Graduate School during this entire period, and must pay the regular residence fees. No student may carry off-campus research work unless he has been in residence in the Graduate School of this University for at least one Quarter. Not more than two Quarters of off-campus research may be applied towards a Master's degree and not more than six Quarters towards a Ph.D. degree. Two Quarters of off-campus research are equivalent to one full Quarter of residence work.

INTERDEPARTMENTAL DEGREE PROGRAMS

The Graduate School recognizes the desirability of programs of study and research which lie on the borderland between two or more recognized fields of learning in such a way that they cannot be easily assigned to any one of them. A doctoral candidate who is interested in such a program should consult with those members of the staff who are most competent to advise him with respect to his special interests. After he has formulated a program of courses and readings which are pertinent to his major interest he should present his proposal to the Dean of the Graduate School. If the student's plan of specialization seems warranted and if he seems competent to utilize materials from two or more recognized fields of learning, the Dean of the Graduate School will appoint a committee from the staffs of the departments which will be most intimately concerned with his work and a representative of the Graduate School. This committee will analyze the student's program, study its feasibility and determine that all basic requirements essential for sound scholarship and the preparation of a satisfactory dissertation have been met. The dissertation must have the unanimous approval of the advisory committee. The plan of study and research as approved by this committee will then be forwarded by the Dean of the Graduate School to the Chairman of each department or to the graduate committee of each department which forms an important part of this borderline field of specialization. If these chairmen or the departmental graduate committees approve this plan of study and research, the Dean of the Graduate School will appoint a doctoral committee consisting of an adviser from each department concerned and a representative of the Graduate School to direct the student's program and to supervise the preparation of his dissertation. The department from which the degree is granted will be determined by the doctoral committee subject to the approval of the department concerned.

THE FRANZ THEODORE STONE LABORATORY

The Franz Theodore Stone Laboratory on Gibraltar Island, Put-in-Bay, Ohio, affords exceptional opportunities to graduate students who wish to carry on research work in botany, entomology, and zoology. The Laboratory will be open during the entire year and students may register for work during any or all of the Quarters. The general rules that apply to graduate work carried on at the University apply equally to the graduate work taken at the Laboratory. The work of instruction is carried on by members of the University Faculty and by members of the faculties of other colleges and universities. Students interested in this work should send to the University Examiner for the Franz Theodore Stone Laboratory Bulletin.

REQUIREMENTS FOR THE DEGREES OF MASTER OF ARTS AND MASTER OF SCIENCE

The degree of Master of Arts will usually be conferred upon candidates whose work lies in the departments properly included in the College of Arts and Sciences, the College of Education, or the College of Commerce and Administration, while the degree of Master of Science will usually be conferred upon candidates whose work lies in the College of Agriculture, the College of Engineering, the College of Medicine, or the College of Veterinary Medicine.

Residence Requirement. A residence of three Quarters or its equivalent wholly devoted to graduate work is required. A graduate of The Ohio State University may do not to exceed one-half of the required work at another institution having equivalent opportunities for study. The candidate is, however, subject to final examination by The Ohio State University on all work offered for the degree.

A student holding a graduate assistantship must spend at least six weeks in addition to the three Quarters, in order to fulfill the residence requirement. For a part-time assistant, a minimum residence of four Quarters is required, during one of which he must devote full time to his graduate work.

Students entering from other accepted graduate schools will be credited with work already completed, provided authorized statements are presented to the effect that such students have credit in the graduate school for the work specified. *However, no student will be given a degree by The Ohio State University unless he has satisfactorily completed forty-five Quarter-hours of work under the guidance of this University.*

A candidate for the Master's degree must be registered in the Graduate School during the Quarter in which he expects to receive the degree.

Course of Study. The course of study shall be selected in consultation with the student's adviser (see page 29). It must show a reasonable degree of concentration on interrelated subjects and must be pursued under at least two professors. The course of study outlined shall be subject to the approval of the Dean of the Graduate School.

While qualification for the Master's degree is not based entirely upon the completion of a definite number of hours of work, nevertheless, the amount of work required must aggregate not less than the equivalent of fifteen hours of classroom work throughout three Quarters, inclusive of the thesis. This presupposes that the student has completed the necessary prerequisites for graduate work in his chosen field and has been admitted to the Graduate School without condition.

Standard of Work Required. A graduate student doing acceptable work must maintain a "B" average in all work included in the course of study outlined for the Master's degree with no more than one-third of the grades "C."

As soon as a student's record falls below the above requirements, he will automatically be made "Special" and will not be reinstated as a candidate for the Master's degree except by permission of the Executive Committee of the Graduate Council. A student who has been made "Special" because of poor grades will not be permitted to register for thesis or dissertation work nor will he be permitted to take the foreign language examinations for the Master's degree or the Doctor of Philosophy degree.

Admission to Candidacy. A student desiring to be admitted to candidacy for a Master's degree must file his application for admission to candidacy for the degree with the Dean of the Graduate School at a date not later than two weeks after the opening of the Quarter in which the degree is sought.

If permission is granted for the late filing of this petition, a penalty of $5.00 will be assessed the candidate.

Application is made upon a special blank secured from the office of the Graduate School. The applications are passed upon by the Executive Committee of the Graduate Council. Admission to candidacy is based upon undergraduate training and ability to pursue graduate work as revealed by the official reports upon the student's course. No student will be admitted to candidacy until he has completed at least the equivalent of two Quarters' work.

Examination. A student working for a Master's degree is required to pass the regular final examinations in all courses for which he is registered and must receive grades in accordance with the regulations of the Graduate School. A final comprehensive examination also is required to test the candidate's knowledge of the course of study which he has pursued. This examination is held after the submission and approval of the thesis; it is conducted by a committee composed of the candidate's adviser (chairman) and at least one other member of the instructional force chosen by him. The final examination may be either written, oral, or both at the option of the examining committee. The chairman of the committee is responsible for arranging the examination and for certifying its results to the Dean of the Graduate School. The report of this committee must be unanimous in order to be considered satisfactory. However, when the examining committee consists of three or more members of the instructional staff, in case of a *single* dissenting vote, the case is automatically referred to the Executive Committee with power to act.

A candidate who fails in his final examination must register in the Graduate School and carry on work for an additional Quarter before an opportunity will be given for a second examination, unless special permission is granted by the Graduate Council for an earlier examination at the request of the department concerned. No student will be permitted a third examination.

Thesis. A satisfactory thesis is required. The subject of the thesis, together with the written approval of the professor directing the work, must be filed in the office of the Graduate School at the time the student applies for admission to candidacy.

A candidate who expects to receive his degree at the end of a given Quarter must submit the completed manuscript of his thesis ready for typewriting to his adviser not later than three weeks prior to Commencement Day. If the manuscript is approved the candidate must at once prepare two typewritten copies of the same, following specifications which may be obtained at the office of the Graduate School. If the thesis is then approved the candidate shall deposit it in duplicate in the office of the Graduate school *not later than a date which will be set by the Graduate School for each Quarter* and must pay, at the same time, to the Bursar a fee ($2.50) covering the cost of binding the same.

In case the thesis has already been published, the candidate, instead of following the above procedure, may present two printed unbound copies to his adviser, not later than three weeks prior to Commencement Day. The form of printing as well as the contents must be approved by his adviser. If the thesis is so approved the student must deposit these copies in the office of the Graduate School *not later than a date which will be set by the Graduate School for each Quarter* and must pay to the Bursar a fee ($2.50) covering the cost of binding the same.

The thesis requirement may be waived by the Dean of the Graduate School upon the written recommendation of the candidate's adviser. In all cases where the requirement is waived, action must be taken prior to the date for the filing of the thesis subject.

Abstract of Thesis. Each candidate must deposit in the office of the Graduate School one *approved* typewritten copy of an abstract of the thesis of approximately three hundred words in length. At the close of each Quarter the Graduate Council proceeds immediately to print the abstracts of all the theses

submitted during the Quarter, and to bind these together, in sufficient numbers to meet the exchange list of the University Library. Each candidate must deposit with the Bursar of the University not later than a *date which will be set by the Graduate School for each Quarter* the sum of $5.00 *in cash.* This sum will be used by the Graduate Council to defray expenses connected with the editing, printing, and binding of the abstracts of theses.

Time Limit on Work for Master's Degree. The entire work for the Master's degree must be completed within a period of six years. In the case of students who take *all* the work for the Master's degree during Summer Quarters, the above rule will be interpreted to include the seventh Summer Quarter.

MASTER OF ARTS DEGREE WITH A FIELD OF SPECIALIZATION IN TEACHING OF THE SOCIAL SCIENCES

The following program of work has been arranged for teachers of the social studies in secondary schools and leads to the degree Master of Arts in the interdepartmental field of social sciences. Supervision of graduate work in this area will be by an interdepartmental supervisory committee appointed by the Dean of the Graduate School and composed of representatives of the Department of Education and of the various social science departments of the University.

Admission to this curriculum will be open to teachers of the social studies in public secondary schools who meet the general requirements for admission to the Graduate School. However, others will be considered eligible who meet the regular admission requirements, provided the following requirements are met before beginning the last full Quarter of work in residence necessary to obtain the degree:

(a) Certification or eligibility for certification by the Department of Education of the State of Ohio or by a state with comparable standards, as a teacher of the social studies; (b) a minimum of fifteen Quarter hours of credit in student teaching or its equivalent in approved teaching experience;(c) an adequate background in the social studies as judged by the Supervisory Committee.

A committee of three members of the instructional staff will be selected by the Supervisory Committee to assist the student in formulating a program for the Master's degree. Ordinarily, this committee will consist of one representative of the Department of Education and one each of the two social science departments.

The central element of the program will be Education 800r, a seminar of three hours a Quarter, for three Quarters, for the coordination of the materials of subject matter fields and their application to the problem of secondary school teaching. The remainder of the program will ordinarily be selected from the social science fields and education. However, advisory committees may approve other courses when they believe such courses will better serve the needs of the students.

REQUIREMENTS FOR THE DEGREE OF MASTER OF DENTAL SCIENCE

Requirements for Admission. Requirements for admission to courses leading to the degree of Master of Dental Science are a better than average record in predental education and graduation with high standing from a dental curriculum, the entrance and graduation requirements of which are equivalent to those now obtaining for the College of Dentistry, The Ohio State University. One year of hospital internship or equivalent is recommended but not required. Candidates for the degree should be well grounded in one or more of the fundamental sciences such as anatomy, histology, physiology, bacteriology, pathology, physics or chemistry.

The program has been developed to give postdoctorate training in one of the specialties of Dentistry. The specialties offered are Orthodontics, Oral Surgery and Anesthesia, Prosthesis, Periodontia, Oral Pathology, and Diagnosis.

Residence Requirement. A minimum of at least six Quarters of full-time work will be necessary to fulfill the residence requirement.

Language Requirement. Although a reading knowledge of German and French is desirable, it will not be a requirement for this degree unless the field of the candidate's investigation necessitates reference to publications in those languages.

Course of Study. Within the first three months of residence the candidate shall submit to the Dental Graduate Committee his proposed program designating the fields of his major and minor. The major shall be one of the specialties enumerated above and two-thirds of the period of residence shall be devoted to its study. The minor shall be in related basic sciences and one-third of the period of residence shall be devoted to its study. Courses in the related basic sciences are listed in the announcement of the Graduate School.

Thesis. Original work must form the basis of a thesis which every candidate shall submit. The subject of the thesis may be in the major or related minor fields and shall be submitted before the end of the third Quarter of residence. The subject of the thesis shall be approved by the candidate's adviser in his major and minor field, as well as by the Dental Graduate Committee. The thesis must show ability to work independently and give evidence of independent thought both in perceiving problems and in making satisfactory progress toward their solution. Familiarity with the bibliography of the special field and correct citation of authority is expected. Unanimous approval of the thesis by the thesis committee will be necessary for acceptance.

Requirements concerning the form in which the thesis shall be submitted as well as the time at which the thesis shall be submitted, the financial obligations and abstract of the thesis, are found on page 36.

General Examination. A conference will be held with the candidate at the end of the first six months of residence. A conference committee will be appointed by the Dean of the Graduate School on recommendation of the Dental Graduate Committee. The conference will be held for the purpose of determining the potentialities of the candidate for successfully completing the work which he has indicated he wishes to undertake.

The Final Examinations. *Before final oral and written examinations may be taken, certification of the candidate's ability to practice his major as a specialty must be given by those familiar with the candidate's work.*

The candidate shall be eligible for the final written examination in the field of the major after acceptance of the thesis. This examination shall cover all work done in the major and may include any work in the related fundamental sciences.

The candidate shall be eligible for the final oral examination after all other requirements are satisfied, including the final written examination, the acceptance of the thesis and approval by those familiar with the work of the candidate and their certification that he is capable of practicing his major as a specialty of Dentistry. The final oral examination will include questions on the history of Dentistry with special reference to the candidate's major field, defense of his thesis, and questions on the related basic sciences.

The final written examination shall be held at least four weeks, and the final oral examination at least two weeks, prior to the Commencement at which the candidate expects to receive the degree. The examining committee shall be appointed by the Dean of the Graduate School on recommendation of the Dental Graduate Committee. The candidate's major adviser shall act as chairman. The time and place of the examination shall be set by the chairman of the examining committee after consultation with other members of the committee.

Financial Obligations. The candidate's attention is called to the schedule of fees of the Graduate School enumerated on pages 17 and 18. In addition to these fees, a non-returnable fee of $100 a Quarter is charged for all graduate work in Dentistry.

A few graduate assistantships in Dentistry are available. Application blanks may be obtained from the Dean of the College of Dentistry. Applications should be submitted not later than March 1 of the same year for which the assistantship is desired. A minimum of at least three years will be necessary to fulfill all requirements for the degree of Master of Dental Science if the candidate is a graduate assistant.

Candidates for this degree must also meet the general requirements regarding standard of work, admission to candidacy, abstract of thesis, etc., as are prescribed for the degrees Master of Arts and Master of Science by the Graduate School.

REQUIREMENTS FOR THE DEGREE OF MASTER OF MEDICAL SCIENCE

The degree of Master of Medical Science (M.M.Sc.) is granted, not on the basis of the successful completion of a definite amount of graduate work, but in recognition of the candidate's high attainment and ability in his special field as shown by the *preparation of a thesis* which is a definite contribution to knowledge and by an examination covering the candidate's special field of interest.

Admission. For admission to this course, the following requirements must be met: (a) a bachelor's degree or its equivalent from an approved college; (b) an M.D. degree from an approved college of medicine; (c) two years of internship in an acceptable hospital; (d) a capacity for independent work and research in some special field.

Language Requirement. Ordinarily a candidate should have a reading knowledge of French and German sufficient to enable him to read the literature of the field in which he is working. However, no formal language requirement is imposed. The language requirement in each individual case will be determined by the literature in the field. The professor in charge of the thesis (the student's adviser) will not accept a student until he is satisfied that all language deficiencies for effective work in that field have been removed.

Course of Study. Not later than the end of the first Quarter of graduate work, the candidate shall file in the office of the Graduate School a proposed program of study which must include the courses for which he proposes to register and the subject of his thesis. Both the program of study and the subject of the thesis must have the written approval of the student's adviser. No formal courses are required and in every case they will form a major part of the program. The emphasis will be on the *research work* to be completed and presented as a thesis.

Residence Requirement. At least six Quarters of graduate study will be necessary to meet the requirements for this degree. The period of residence is, however, a secondary requirement. The important requirements are the successful completion of an investigation and an examination in the special field. The student must be registered in the Graduate School during the period of residence.

Thesis. The thesis must give evidence of originality and power to carry on independent investigation. It must embody results of research which form a real contribution to knowledge and must show a mastery of the literature of the special field. The results of the investigation should be of such significance that they would always be suitable for publication in one of the

learned journals in that field. Not later than a date which will be set by the office of the Graduate School, during the student's last Quarter of registration, two approved typewritten copies of the thesis must be deposited in the Graduate School office. The thesis must be typed in accordance with specifications furnished by the Graduate School office. The student must deposit with the Bursar of the University the sum of $2.50 to cover the cost of binding the two copies of the thesis.

Final Examination. After the thesis has been completed and accepted, the Dean of the Graduate School shall appoint an examining Committee consisting of the candidate's adviser as chairman and at least two other members of the graduate faculty representing the same or allied fields of science. The examination may be either written or oral at the option of the committee. It shall have special reference to the thesis and the candidate's field of specialization. A unanimous affirmative vote of all members of the committee shall be necessary for the recommendation of the candidate for the degree. The chairman of the examining committee shall be responsible for arranging the final examination and for certifying the results of the examination to the office of the Graduate School. This examination must be taken in the student's last Quarter of residence, not later than a date which will be set by the office of the Graduate School for each Quarter.

Candidates for this degree must also meet the general requirements regarding standard of work, admission to candidacy, abstract of thesis, abstract fee, etc., prescribed for the degrees, Master of Arts and Master of Science.

REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN PHARMACY

The degree of Master of Science in Pharmacy (M.Sc. in Pharm.) is essentially a research degree intended for those preparing for careers as teachers of pharmacy or research workers in that field. It is granted in recognition of the candidate's high attainment and ability in some special field of pharmacy, as shown by the preparation of a thesis which is a definite contribution to knowledge and by examinations covering the candidate's special field of interest.

Admission. The requirements for admission to the course of study leading to this degree is graduation with high standing from an accredited college of pharmacy whose entrance and graduation requirements are equivalent to those in effect for the College of Pharmacy of The Ohio State University. A Registered Pharmacist certificate or a year of practical experience is recommended but not required. Candidates for this degree should be well grounded in the biological and physical sciences which are fundamental to pharmacy.

Language Requirements. Ordinarily the candidate should have a knowledge of French and German sufficient to allow him to read the literature in his special field in pharmacy. However, no formal language requirement is imposed, the requirement being determined in each case by the literature in the field. A student without the necessary facility to read the literature in this field, will not be permitted to proceed with this degree.

Course of Study. Not later than the first Quarter of residence the candidate shall submit to the Graduate Committee in Pharmacy his program of study. It must show the subject of the proposed thesis and the courses to be undertaken in the field of specialization and in related fields. At least one-third of the period of residence must be devoted to the study of subjects cognate to pharmacy. Both the program of study and the subject of the thesis must have the written approval of the student's adviser and be filed in the office of the Graduate School immediately after being approved by the Graduate Committee in Pharmacy.

Residence Requirement. At least six Quarters of full-time graduate study will be necessary to meet the requirements for this degree. The period of residence is, however, a secondary requirement. The important requirements are the successful completion of the thesis and the prescribed courses and examinations in the candidate's special field. The student must be registered in the Graduate School during his entire period of residence for the degree.

Thesis. The thesis must give evidence that the candidate has the originality and power to carry on independent investigations and has mastered the literature of the field in which the thesis falls. The results embodied in the thesis should be of sufficient importance to justify their publication in a technical journal in that field. Not later than a date which will be set by the office of the Graduate School during the student's last Quarter of residence, two approved copies of the thesis and one approved copy of an abstract of the thesis must be deposited in the office of the Graduate School. The thesis must be typed in accordance with the specifications furnished by the Graduate School office. The student must deposit with the Bursar of the University the sum of $7.50 to cover the cost of binding the two copies of the thesis and for editing and printing the abstract.

Final Examination. After the completion and acceptance of the thesis, the Dean of the Graduate School shall appoint an examining committee consisting of the candidate's adviser as chairman and at least two other members of the graduate faculty representing the same or allied fields of science. The examination may be either written or oral or both at the option of the committee. It shall have special reference to the thesis and the candidate's field of specialization. A unanimous affirmative vote of all members of the committee shall be necessary for recommendation of the candidate for the degree. The chairman of the examining committee shall be responsible for arranging for the final examination and for certifying the results of the examination to the office of the Graduate School. The examination must be taken in the student's last Quarter of residence, not later than a date which will be set by the office of the Graduate School for each Quarter.

Candidates for this degree must also meet the general requirements regarding standard of work, admission to candidacy, abstract of thesis, etc., as are prescribed for the degrees, Master of Arts and Master of Science.

GRADUATE CURRICULA IN SOCIAL ADMINISTRATION

The special requirements for the degree Master of Arts in Social Administration are given on page 259 of this bulletin.

GRADUATE COURSE IN PUBLIC ADMINISTRATION

Special requirements for the degree Master of Science in Public Administration will be found on page 247 of this bulletin.

DEGREE OF MASTER OF BUSINESS ADMINISTRATION

GENERAL REQUIREMENTS

To receive the degree of Master of Business Administration students must comply with all the regular requirements laid down for the degrees, Master of Arts and Master of Science (see page 35). In addition to these requirements each candidate must meet the following general requirements.

Prerequisites. Before a student may become a candidate for the degree of Master of Business Administration or early in his Master's work he must have credit for the following subjects: Principles of Economics, Principles of Accounting, the equivalent of six Quarter-hours in Business Law, introductory courses in Corporation Finance, Industrial Management, Marketing, Economic

Statistics, Money and Banking. (If the specific courses noted are taken while the student is enrolled in the Graduate School, credit so earned will not be counted toward the requirements for the Master of Business Administration degree.)

A thesis will be required of all candidates for this degree and the credit granted for the thesis shall not exceed six Quarter hours.

The credit granted for work in the field of specialization shall not be less than twelve nor more than twenty Quarter hours.

The candidate shall take work in at least three fields other than his field of specialization.

In addition to these general prerequisites, the department in which the candidate elects to specialize will have the following prerequisites:

The Department of Accounting: credit for additional courses in Business Law, three Quarter-hours; Public Finance, six Quarter-hours; Accounting, thirty-five Quarter-hours.

The Department of Business Organization: One course in either Transportation, Insurance, Public Utilities, or Economic Geography for a student wishing to specialize in any one of the fields of Business Organization.

The Department of Geography: at least eighteen Quarter hours in courses in Geography, including economic geography, the United States, and another regional course.

REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Scholastic Requirements. The general requirements for the degree of Doctor of Philosophy are: (1) A reasonable mastery of the field of specialization chosen, tested by a general comprehensive examination given approximately one year previous to the date on which the candidate expects to come up for the degree; (2) compliance with the language requirements as set forth in the paragraph entitled "Language Requirement," see below; (3) the presentation of an acceptable dissertation embodying the results of an original investigation; and (4) the passing of a final oral examination upon the dissertation and the immediate field in which the investigation lies.

Residence Requirement. At least three years of work devoted wholly to graduate study and investigation with suitable facilities and under proper supervision—or the equivalent thereof—are required for the completion of the residence requirement for the degree Doctor of Philosophy. Of these years, at least one, and that except by the permission of the Graduate Council, the last, must be spent in residence at this University. In case any part of the work is done elsewhere than in this University, such work shall be subject to the approval of the Graduate Council.

The residence requirement for the Ph.D. degree may not be satisfied by residence during Summers only. Three consecutive Quarters *in residence* are required after the Master's degree or after one year of graduate work where the Master's degree is not taken.

A candidate for the degree of Doctor of Philosophy must be registered in the Graduate School during the Quarter in which he expects to receive the degree.

Course of Study. The course of study to be pursued for the Doctor's degree will be arranged with each student by his adviser, but the choice of work must be approved as a whole by the Dean of the Graduate School. Work in other departments will be advised according to the needs of the individual student. In all cases the aim will be a reasonable concentration and a reasonable breadth of study, designed to foster both a knowledge of the specialty in relation to allied branches of learning and the power of productive scholarship.

Language Requirement. The foreign language requirements for the Ph.D. degree may be met by one of the two following methods: (1) A dictionary reading knowledge of two modern foreign languages; (2) a thorough reading knowledge of one modern foreign language.

The candidate's adviser, after securing the approval of the chairman of the department must notify the office of the Graduate School, in writing, of the method which the candidate will use in fulfilling the language requirements.

The modern foreign languages submitted under methods 1 and 2 must be languages in which there is a substantial body of scholarly literature bearing upon the student's field of specialization or languages which can be shown to be otherwise of substantial value to the student in the practice of the profession for which his doctoral study is preparation.

Before a student will be permitted to take his general examination, he must meet the language requirements. The language examinations are conducted by the language departments concerned and are given once each Quarter on a date announced at the opening of the Quarter. Blanks for taking these examinations must be obtained at the office of the Graduate School not later than ten days before these announced dates. The subject matter of the examination shall be drawn from the literature of the student's field of specialization.

It is urged that students preparing for the language examinations consult the members of the Romance Languages or German Departments in charge of examinations *before* beginning such preparation.

A candidate may repeat the examination in a language which he has failed. However, he shall not be permitted to take more than *three* examinations in any language.

No student will be permitted a re-examination in modern foreign languages during the same Quarter in which he failed the examination. Permission for re-examination in subsequent Quarters can be granted only by the examiner, upon evidence of work done since the former examination, sufficient to justify a re-examination.

General Examination and Admission to Candidacy. Not later than the middle of the second Quarter prior to the Quarter in which he expects to come up for his degree, a student working for the degree of Doctor of Philosophy is required to pass a general comprehensive examination on the fundamentals of the entire field in which he has elected to specialize without limitation to the courses which the student has pursued. For example, a student who expects to come up for the degree at the end of the Spring Quarter must pass this general examination not later than the middle of the Autumn Quarter. He must be registered during the Quarter in which he expects to take the general examination unless excused by the Dean of the Graduate School. This examination must be a written one followed by an oral examination. The satisfactory passing of this examination carries with it admission to candidacy for the degree.

After admission to candidacy the candidate must be registered in the Graduate School for at least two more Quarters provided this will complete his residence requirement. Whenever a student is permitted to take the general examination without being registered, he must register for at least *three* more Quarters before coming up for the degree. He will be given complete freedom from all course requirements and will be registered for dissertation only. However, he will be permitted to audit any courses he may choose. No student will be permitted to take the general examination until after he has met the language requirements.

The general examination is conducted by a committee appointed by the Dean of the Graduate School, upon written request of the student's adviser. This committee shall consist of the student's adviser (who acts as chairman), and such other examiners as the Dean may designate, including at least one who is not a member of the department directly concerned. When the adviser

decides that the student is ready for the general examination, he will so notify the office of the Graduate School, in writing, at the same time suggesting the personnel of the examining committee, for the approval of the Dean. After the committee has been approved by the Dean, appropriate blanks for reporting the results of the examination will be sent to the adviser. The selection of a time and place for the examination will be entirely in the hands of the adviser, but he is expected to consult with the various members of the committee before fixing a time for the examination. Immediately after the close of the examination the committee shall certify to the Graduate School, on the blank furnished the committee, whether or not the student has passed the examination. In order to be considered satisfactory, the report of the examining committee must be unanimous. However, when there is but a *single* dissenting vote the case is automatically referred to the Executive Committee with power to act.

If a candidate fails the general examination he cannot be re-examined until the examining committee recommends such a re-examination and the Graduate Council approves the recommendation. No candidate will be permitted to take the general examination more than twice.

Dissertation. A dissertation which is a definite contribution to knowledge of importance sufficient to warrant its publication shall be offered by the candidate. *A copy of the completed dissertation bearing the written approval of the candidate's adviser must be presented at the office of the Graduate School not less than four weeks previous to the end of the Quarter in which the degree is sought.*

The Dean, after consultation with the candidate's adviser, shall then appoint a Committee to consider the merit of the dissertation. In order to expedite the reading of the dissertation by the committee, it is suggested that the first draft of the dissertation be accompanied by a written suggestion from the candidate's adviser concerning the personnel of the reading committee. The dissertation, together with the report of this Committee, shall be laid before the Council, who will then vote upon the question of its acceptance. In order to be considered satisfactory the report of the committee must be unanimous.

Each candidate must deposit in the office of the Graduate School, not later than a date which will be set by the Graduate School for each Quarter, two *approved* printed or typewritten copies of the complete dissertation, complying in form with specifications obtainable in the Graduate School office. The candidate must also deposit the sum of $2.50 with the Bursar of the University to cover the cost of binding these copies.

The Final Examination. The final examination is held after the approval of the dissertation. It shall be conducted by a committee consisting of the candidate's adviser (who shall act as chairman) and such other examiners as the Dean of the Graduate School shall designate, after consultation with the candidate's adviser, and shall include at least one person who is not a member of the department directly concerned. The time and place of the examination shall be set by the Chairman of the Examining Committee after consultation with the other members of the committee and the office of the Graduate School shall be promptly notified. The examination shall be oral and shall deal intensively with the portion of the candidate's field of specialization in which his dissertation falls, though it need not be confined exclusively to the subject matter of the dissertation. A written examination also may be required at the discretion of the department concerned. In order to be considered satisfactory the report of the examining committee must be unanimous. However, when there is but a *single* dissenting vote, the case is automatically referred to the Executive Committee of the Graduate Council with power to act.

Abstract of Dissertation. Each candidate must also deposit in the office of the Graduate School, not later than a date which will be set by the Graduate School for each Quarter, one *approved* typewritten copy of an abstract of the

dissertation, not more than three thousand words in length. He must also deposit with the Bursar of the University, not later than a date which will be set by the Graduate School each Quarter, the sum of $50.00 *in cash*. This sum will be used by the Graduate School to defray the expenses connected with the editing, printing, and binding of the abstracts of dissertations.

COMMENCEMENT—CONVOCATION

A special Convocation or Commencement is held at the close of each Quarter for the conferring of degrees upon candidates who have fulfilled all the requirements of their respective courses.

ATTENDANCE AT CONVOCATION EXERCISES

All candidates for degrees are required to be present at their graduation convocation unless excused by the President.

RESEARCH INSTITUTES

The following institutes have been organized for furthering research in various fields in order to afford the facilities for carrying on research work whose confines are not limited to a single department:

(a) **The Plant Institute.** This institute affords the facilities of the Departments of Botany, Horticulture, Agricultural Chemistry and Agronomy.

(b) **The Social Science Institute.** This institute deals with problems which lie in two or more of the following departments: Business Organization, Business Research, Economics, Education, Educational Research, Geography, History, Law, Philosophy, Political Science, Psychology, Rural Economics, Social Administration, and Sociology.

UNIVERSITY ORGANIZATIONS

There are a number of organizations in the University of especial interest to the graduate students. The Gamma Alpha Fraternity, a graduate scientific society, has its own house at which a number of the members of the society live and a still larger number board. There is also the Graduate Club in social educational sciences and the Graduate Women's Club.

The main object of all of these clubs is to bring members together for social purposes and for the discussion of the various problems in which the individual members are interested.

There are also chapters of the national honorary societies, Phi Beta Kappa and Sigma Xi, as well as a number of honorary fraternities. In addition to these, nearly every department offering graduate work has its own graduate club.

UNIVERSITY LECTURES

Each year a number of lectures of special interest to graduate students are given by distinguished scholars from various educational institutions. Some of these lectures are of interest primarily to those in certain fields of work while others are of a general character and of interest to graduate students in general, no matter what their fields of activity may be.

DEPARTMENTS OF INSTRUCTION

The general prerequisites for courses open to graduate students with credit toward a degree are given below. In some departments more detailed prerequisites are required, and in all such cases a statement of these will be found in the description of the courses listed in the departments.

General prerequisites for courses numbered from 600 to 799:

At least junior standing and prerequisites that amount to 20 Quarter hours in the same and allied subjects of which a minimum of at least 10 Quarter hours must be in the same subject; or 30 Quarter hours in not more than two allied subjects.

Special prerequisites as stated in the description of courses must be included within these requirements.

Certain 600 courses in the field of education require as a prerequisite graduate standing in the field of education. These courses are appropriately designated in the list given under the general heading of "EDUCATION."

General prerequisites for courses numbered 800 or above:

These courses are open only to students registered in the Graduate School and have prerequisites that amount to 30 Quarter hours in the same and allied subjects, of which a minimum of 15 Quarter hours must be in the same subject.

COURSES OF GENERAL INTEREST

The courses listed below are of such a character as to be of general interest to all graduate students irrespective of their fields of specialization.

Survey Course 605. Foundations of Contemporary Civilization.

Survey Course 608. Development of Modern Science.

(For a full description of these courses see page 274 of this bulletin, under the heading "Survey Courses.")

Philosophy 652. Philosophy of Science.

(For a detailed description of this course see page 214 of this bulletin.)

ACCOUNTING

Office 305, Commerce Building

PROFESSORS MILLER, TAYLOR, ECKELBERRY, AND WILLCOX, ASSOCIATE PROFESSORS HECKERT AND DICKERSON, ASSISTANT PROFESSORS SHONTING, BURNHAM, JENCKS, FLEIG, AND McCOY, MR. BOLON

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," see page 46.

602. Advanced Principles of Accounting. Five credit hours. One Quarter. Autumn, Winter, Spring. Five class meetings each week. Mr. Miller, Mr. Eckelberry, Mr. Burnham.

A study of the application of basic principles to the accounting problems arising in connection with consignment sales, installment sales, branch house operations, mergers and reorganizations, statements for holding companies and their subsidiaries, the dissolution of business units, and fiduciary operations.

Not available for graduate credit for students majoring in accounting.

603-604. Cost Accounting. Five credit hours. Two Quarters. 603, Autumn and Winter; 604, Winter and Spring. Five class meetings each week. Not open to students who are taking Accounting 624. Mr. Willcox, Mr. Heckert.

The work of the first Quarter consists of a discussion of the fundamental principles of cost determination. Emphasis is placed on the use of cost information in the control of manufacturing activities and the relationships between costs, selling prices, and profits. Accounting for material and labor cost is discussed in detail.

In the second Quarter a study is made of the more complex problems relating to manufacturing expenses and the proper allocation of these costs to departments and products. Consideration is also given to cost accounting principles arising in connection with process costs, by-product costs, joint costs, and standard costs. A brief summary of the fundamentals of distribution cost accounting is also included.

Not available for graduate credit for students majoring in accounting.

610. Cost Reports for Executives. Three credit hours. Winter Quarter. General prerequisites must include Accounting 604 or 624. Mr. Willcox.

A study of the principles underlying the preparation and use of operating reports. Some consideration will be given to the form and content of reports for both major and minor executives.

612. System Building. Four credit hours. One Quarter. Autumn and Spring. Four class meetings each week. General prerequisites must include Accounting 604. Mr. Heckert, Mr. Willcox.

Principles underlying the design and installation of accounting systems and practice in the design of systems for industrial, commercial, financial, service, and institutional business concerns. Machine accounting methods and manuals of procedure are studied.

613-614. Accounting Practice. Four credit hours. Two Quarters. 613, Autumn and Winter; 614, Winter and Spring. Four class meetings each week. General prerequisites must include Accounting 602, 604, 616, and 640. Mr. Miller, Mr. Eckelberry, Mr. Dickerson.

Practice in the solution of typical accounting problems. The class material is taken largely from the Certified Public Accountants' examinations of the various states.

616. Business Statements. Three credit hours. One Quarter. Autumn, Winter, Spring. Three class meetings each week. Mr. Bolon, Mr. McCoy.

A study of the flow or movement of funds as reflected in the financial statements. The use of ratios and other indices in the analysis and interpretation of the financial position, together with the trends and variations therein, are considered in detail. The subject matter is developed through lectures and problems supplemented with published financial statements. Each student prepares, under supervision of the instructor, an analysis of the current financial statements of some prominent corporation, together with a comparison with the principal competitors in the field.

619. Budgeting. Three credit hours. Autumn Quarter. General prerequisites must include Accounting 602 and 604. Mr. Heckert.

The development of business budgets and their use in the planning and control of private business enterprises.

Not open to students who have credit for Accounting 617.

620. Controllership. Three credit hours. Winter Quarter. General prerequisites must include Accounting 602 and 604. Mr. Heckert.

The function, duties, and responsibilities of the chief accounting officer in a private business enterprise. The use of accounting and statistical data in the planning, coordination, control, and protection of business.

Not open to students who have credit for Accounting 617.

622. Advanced Accounting Theory. Three credit hours. Spring Quarter. General prerequisites must include Accounting 602. Mr. Miller.

An examination of some of the prevailing theories of accounting. Recent theories in connection with the valuation of assets; the determination of income and surplus. Each student is required to make a report covering the investigation of some particular subject.

624. Factory Costs. Five credit hours. One Quarter. Autumn, Winter, Spring. Five class meetings each week. Not open to students taking Accounting 603-604. Mr. Burnham.

This course is intended primarily for students whose major interest is in fields other than accounting. The methods of accumulating material, labor and expense costs for job order and process costs accounting are studied. Joint and by-product costs as well as standard costs are considered. The place and value of cost reports and the relationship of the cost department to other business departments are discussed.

626. Cost Accounting for Marketing Activities. Three credit hours. One Quarter. Autumn, Winter, Spring. Three class meetings each week. General prerequisites must include a course in intermediate accounting, a course in elementary economic statistics, and Business Organization 700. Not open to accounting majors. Mr. Heckert, Mr. Willcox.

Special problems in accounting related to the distribution activities of manufacturers, wholesalers, retailers, etc. Particular attention is given to the analysis of distribution costs by territories, commodities, customers, channels, and size of order; and methods of controlling cost of such functions as purchasing, warehousing, advertising, selling, delivery, credit, and collections.

628. Accounting for Operations of Financial Institutions and Fiduciaries. Three credit hours. Autumn Quarter. Prerequisite, Accounting 403. Mr. Eckelberry.

Special problems arising in the application of accounting theory and practice to the operations of banks, savings and loan institutions, brokerage houses, insurance companies, receiverships, estates, and trusts.

630. Governmental Accounting and Budgeting. Three credit hours. Spring Quarter. Three class meetings each week. General prerequisites must include a course in intermediate accounting. Mr. Shonting.

The principles of accounting and budgeting for national, state, and local governments. A study of the fiscal structure of various forms of government. Budgeting and bugetary control. The application of accounting principles to government, with special reference to funds, appropriations, and allotments. The application of costs to governmental activities. The preparation of governmental financial statements and reports.

635. Auditing. Five credit hours. One Quarter. Autumn and Spring. General prerequisites must include Accounting 602 and 604. Mr. Wall, Mr. Miller, Mr. Dickerson, Mr. Jencks.

The various kinds of audits and their respective uses. Methods followed in verifying balance sheet and profit and loss accounts. Audit reports and certificates. Duties and responsibilities of the auditor.

640. Federal Tax Accounting. Five credit hours. One Quarter. Autumn, Winter, Spring. General prerequisites must include a course in intermediate accounting. Mr. Dickerson, Mr. Miller, Mr. Jencks.

A study of the more important federal tax laws and regulations with emphasis on the practical aspects. Special attention will be given to the provisions relating to the determination of the income and excess profits tax liability, the preparation and filing of returns, and the procedure required in dealing with the Treasury Department.

645. Accounting Literature. One credit hour. One Quarter. Winter and Spring. One class meeting each week. Open only to seniors and graduate students majoring in Accounting. Mr. Miller, Mr. Willcox, Mr. Eckelberry.

A survey of literature in the fields of theory, costs, systems, auditing and specialized industries. Brief consideration of authors and contributing associations.

Not open to students who have credit for Accounting 535.

650. Accounting for Public Service Enterprise. Three credit hours. Winter Quarter. General prerequisites must include Accounting 602 and 604. Mr. Eckelberry.

Special problems arising in the application of accounting theory and practice in the operation and control of selected public service enterprises, including air transportation.

655. Accounting Requirements of Governmental Regulatory Agencies. Three credit hours. Spring Quarter. General prerequisites must include Accounting 602 and 604.

A survey of the regulations governing accounting procedures and reports for various state and federal agencies such as the Securities and Exchange Commission, Federal Trade Commission, Ohio Tax Commission, and others.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

804-805-806. Seminar in Accounting. Two credit hours. Autumn, Winter, and Spring Quarters.

807. Distribution Costs. Three credit hours. Autumn Quarter. Three class meetings each week. General prerequisites must include a course in intermediate accounting, Business Organization 700, and Accounting 603-604 or permission of the instructor. Mr. Willcox, Mr. Heckert.

Procedure and technique for analysis and control of distribution costs. Application of sorting and tabulating equipment to sales and expense analysis will be illustrated.

810. Advanced Federal Income Tax. Two credit hours. Autumn Quarter. General prerequisites must include Accounting 621. Mr. Dickerson.

Investigation of federal income tax problems and procedures. A conference course, subject to adaptation to individual needs of graduate students.

813. Advanced Auditing. Two credit hours. Spring Quarter. General prerequisites must include Accounting 608. Mr. Eckelberry, Mr. Miller.

Investigation of auditing problems, procedures, and auditors' reports. A conference course, subject to adaptation to individual needs of graduate students.

950. Research in Accounting. Autumn, Winter, and Spring Quarters.

ADULT EDUCATION

(See Bureau of Special and Adult Education)

AERONAUTICAL ENGINEERING

PROFESSOR VON ESCHEN

601. Aerodynamics. Three credit hours. Winter Quarter. Three recitations each week. General prerequisites must include Mechanics 610.

Aerodynamic forces; streamlines and velocity distribution: flow of non-viscous fluids; vortex laws; Kutta Joukousky law; viscosity effects; drag of flat plates and cylinders; boundary layers; Prandtl wing theory for finite wing; airfoil sections; propulsion and power required for flight.

610. Aircraft Stress Analysis. Five credit hours. Spring Quarter. Five recitations each week. General prerequisites must include Mechanics 615 and Aeronautical Engineering 601.

Applied and design loads; stress and strain relationships; beams with one axis of symmetry; work and strain energy; for bending and torsion; long and short column design; thin-walled columns of non-symmetrical shape; torsional instability of columns; plane and stiffened flat panel design.

***701. Aerodynamics.** Three credit hours. Winter Quarter. Three recitations each week. Aeronautical Engineering, fifth year. Prerequisite, Aeronautical Engineering 601.

A continuation of Aeronautical Engineering 601.

710. Aircraft Structures. Three credit hours. Winter Quarter. Three recitations each week. Aeronautical Engineering, fifth year and fourth year in the transitional program. Prerequisite, Aeronautical Engineering 610.

A continuation of Aeronautical Engineering 610.

711. Aircraft Layout. Five credit hours. Spring Quarter. Three recitations and two three-hour laboratory periods each week. Aeronautical Engineering, fifth year and fourth year in the transitional program. Prerequisite, Aeronautical Engineering 601 and 710 or 810.

A study of the layout of complete airplanes.

713. Aeronautical Laboratory. Three credit hours. Spring Quarter. One four-hour laboratory period each week. Aeronautical Engineering, fifth year and fourth year in the transitional program. Prerequisite, Aeronautical Engineering 701 and Mechanical Engineering 666 or Aeronautical Engineering 601 and Mechanical Engineering 780.

810. Aircraft Structures. Five credit hours. Autumn Quarter. Five class hours each week. Aeronautical Engineering, fifth year and fourth year in the transitional program. Prerequisite, Aeronautical Engineering 610.

Application of the principles of stress analysis to aircraft structures.

812. Aircraft Design. Five credit hours. Spring Quarter. Conference, library and laboratory work. Aeronautical Engineering, fifth year and fourth year in the transitional program. Prerequisite, Aeronautical Engineering 701 and 810 and Mechanical Engineering 666.

950. Research in Aeronautical Engineering. Autumn, Winter, and Spring Quarters.

AGRICULTURAL CHEMISTRY

Office, 211 Townshend Hall

PROFESSORS LYMAN, ALMY, AND BURRELL

Requirements for the Master's Degree: (a) *In Plant Chemistry*—Course work must include one year of organic chemistry with laboratory; at least two Quarters of physical chemistry with laboratory work; Agronomy 602 or its equivalent in quantitative analysis; plant physiology (Botany 605 and 606) and Agricultural Chemistry 601 or their equivalents. (b) *In the Chemistry of Food and Nutrition*—Course work must include twelve Quarter hours in organic chemistry with laboratory; Agricultural Chemistry 601, 602, and 607; Zoology 609; and two Quarters of physical chemistry with laboratory. (c) *In Food Analysis*—Course work must include the following, to be attained by previous advanced undergraduate work, or to be completed with other specified requirements for the Master's degree before the candidate shall be considered eligible for the degree: Agronomy 602 or two Quarters of quantitative analysis; Agricultural Chemistry 601, 602, and 607; Bacteriology 607 and 614; Organic Chemistry 647, 648, 649, 650; Physical Chemistry 681, 682, 691, 692 or their equivalents. (d) *In Dairy Chemistry*—Course work must include the following, to be attained by previous advanced undergraduate work, or to be completed with other specified requirements for the Master's degree before the candidate shall be considered eligible for the degree: Agricultural Chemistry 601, 602, 604, 605; Bacteriology 607; Organic Chemistry 647, 648, 649, 650; Physical Chemistry 681, 682, 691, 692 or their equivalents.

* Not given in 1946-1947.

Requirements for the Ph.D. Degree: (a) *In Plant Chemistry*—Course work must include in addition to that specified for the Master's degree; a third Quarter of physical chemistry with laboratory; physiological methods (Botany 632 and 633); plant microchemistry (Botany 617); Agricultural Chemistry 607 and 801; and Chemistry 628 (spectroscopic analysis), 641 (qualitative organic analysis), and 642 (organic quantitative analysis). (b) *In the Chemistry of Food and Nutrition*—Course work must include, in addition to that specified for the Master's degree, a third Quarter of physical chemistry with laboratory; Chemistry 628 (spectroscopic analysis); 641 (qualitative organic analysis); and 642 (organic quantitative analysis); Bacteriology 607 and 614; Physiology 626 and 627; and Anatomy 613, 616, and 619. (c) *In Food Analysis*—Course work must include in addition to that specified for the Master's degree the following courses or their equivalents: Chemistry 628, 641, 642, 695, 683, 693. (d) *In Dairy Chemistry*—Course work must include, in addition to that specified for the Master's degree, the following courses or their equivalents: Agricultural Chemistry 607; Bacteriology 610, 611, 614; Chemistry 628, 641, 642, 695, 683, 693.

At the end of the first year of residence study all candidates for the Doctor's degree must pass a general departmental examination.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

601. General Biological Chemistry. Five credit hours. One Quarter. Autumn and Winter. Three lectures and two three-hour laboratory periods each week. General prerequisites must include a course in general agricultural chemistry, or its equivalent in organic chemistry and quantitative analysis, together with five hours of biological science. Mr. Burrell.

A study of the chemistry of the fats, carbohydrates, proteins, and other compounds of biological importance, and the general chemistry of the metabolism of plants and animals. This course is intended for students majoring in biological subjects, and as a prerequisite to certain advanced courses in this department.

***604. Advanced Dairy Chemistry.** Five credit hours. Autumn Quarter. Three lectures and two three-hour laboratory periods each week. General prerequisites must include Agricultural Chemistry 601 or fifteen hours of Agricultural Chemistry. Given in alternate years. Mr. Almy.

A survey is made of recent developments in the chemistry of inorganic and organic milk constituents. Laboratory work is based on preparations described in recent publications. A continuation and extension of the material discussed in elementary course in dairy chemistry.

***605. Advanced Dairy Chemistry.** Five credit hours. Winter Quarter. Three lectures and two three-hour laboratory periods each week. General prerequisites must include Agricultural Chemistry 604. Given in alternate years. Mr. Almy.

Advanced physicochemical relations of milk and dairy products. Foaming, adsorption phenomena, recent advances in colloidal chemistry of milk, and study of electrometric methods of measuring H-ion concentration, and oxidation-reduction potential, and oxidation-reduction systems in milk are some of the topics treated in lecture and laboratory.

607. Chemistry of Nutrition. Five credit hours. Winter Quarter. Two lectures and three three-hour laboratory periods each week. General prerequisites must include Agricultural Chemistry 601 and acceptable courses in physiology, or equivalent. Mr. Lyman.

Lectures on the chemistry of nutrition. Laboratory work includes experiments on digestion and utilization of food, determination of fuel value of food and the heat production of man under various conditions, the analysis of blood for waste products of metabolism, the effects on small animals of diets consisting of purified food constituents, and the effects of selected diets on the formation of waste products in the body.

610. Horticultural Chemicals. Five credit hours. Winter Quarter. Three lectures and two three-hour laboratory periods each week. General prerequisites must include a course in general agricultural chemistry or equivalent and fifteen hours of biological science. Undergraduates will be permitted to register for this course only on permission of the instructor. Mr. Witman.

Organic and inorganic substances used in horticulture as insecticides, fungicides, growth hormones, etc., are studied.

* Not given in 1946-1947.

611. Chemistry of Vitamins. Five credit hours. Spring Quarter. Three lectures and two three-hour laboratory periods each week. General prerequisites must include Agricultural Chemistry 601. Mr. Lyman, Mr. Shetlar.

Lectures on the isolation, synthesis, physiological effects, natural distribution and laboratory determination of vitamins. Laboratory work includes determination by physical and chemical methods of several of the vitamins.

612. Cereal Chemistry. Five credit hours. Winter Quarter. Three lectures and two laboratory periods each week. General prerequisites must include Agricultural Chemistry 601. Mr. Lyman.

Lectures will survey the field of cereal chemistry, including the chemistry of processing, storage and manufacture of flour, bread and other cereal products.

Laboratory work will deal with chemical and physical methods used for control and research purposes by the cereal chemist.

613. Chemistry of Food Technology. Five credit hours. Winter Quarter. Three lectures and two three-hour laboratory periods each week. General prerequisites must include Agricultural Chemistry 601 or fifteen hours of Agricultural Chemistry. Mr. Lyman.

Lectures cover physical and chemical properties of foods and their relation to processing and storage, mixing, coating, forming, heat transfer, dehydration, corrosion, stability, etc. Laboratory work includes practice in determination of density, refractive index, viscosity, surface tension, hydrogen-ion concentration, buffer index and oxidation-reduction potential and their application to food processing and food stability.

701. Special Problems. Three to fifteen credit hours, taken in units of three or five hours each Quarter for one or more Quarters. Autumn, Winter, and Spring Quarters. General prerequisites must include Agricultural Chemistry 601. The consent of the instructor is required. Offered at Columbus and at Wooster. All instructors.

Students electing this course must have had at least two five-hour courses in the department. Consent of the department must be secured.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

801. Plant Chemistry. Five credit hours. Spring Quarter. Two lectures or discussions and three three-hour laboratory periods each week. General prerequisites must include Agricultural Chemistry 601 and Botany 605. Mr. Burrell.

The laboratory work includes a detailed, quantitative analysis of fresh plant tissue. The lectures and discussions center around: (1) a study of the chemical composition of plants in which "Official Methods" of analysis are reviewed and more recent methods evaluated; (2) a study of the results of such analyses with possible applications to the explanation of plant processes.

804. Seminar. One credit hour. Autumn, Winter, and Spring Quarters. Required of all graduate students majoring in agricultural chemistry. General prerequisites must include Agricultural Chemistry 601. Offered at Columbus and at Wooster. Mr. Lyman.

950. Research in Agricultural Chemistry. Autumn, Winter, and Spring Quarters. Laboratory, library, and conference work. General prerequisites required. Offered at Columbus and at Wooster. Mr. Lyman, Mr. Burrell, Mr. Almy.

Research may be done in nutrition, plant chemistry, food analysis, or dairy chemistry.

AGRICULTURAL EDUCATION

Office, 215 Ives Hall

PROFESSORS STEWART AND FIFE, ASSISTANT PROFESSOR RHOAD

Prerequisites for Graduate Work: In addition to major work in agricultural education the candidate must complete course work in at least three other areas of specialization in the field of general education, as determined by the candidate's advisory committee. By permission the candidate may use one area from the field of technical agriculture. He should have had at least one year of successful experience as a teacher of vocational agriculture, or administrative experience in agricultural education.

Departmental Committee on Graduate Work: A committee, including the Chairman of the Department, acts in an advisory capacity for graduate students and is in charge of the administration of the regulations of the Department.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

601. Special Methods of Teaching Vocational Agriculture in Secondary Schools. Five credit hours. One Quarter. Autumn and Winter. Two three-hour conferences each week. Mr. Rhoad.

An intensive study of the problems experienced in student teaching, and the development of the student in activities not necessitating classroom situations.

701. Special Problems. Three to fifteen credit hours, taken in units of three or five hours each Quarter. Autumn, Winter, and Spring Quarters. All instructors.

This course is intended for graduates who wish to work out problems in Agricultural Education including Agricultural Extension and Vocational Education in Agriculture

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

Special problems are designed particularly for the training of supervisors of agricultural education and trainers of teachers of vocational agriculture.

†**802. Practicum in Agricultural Education.** Four credit hours. The equivalent of five two-hour periods each week for discussions, laboratory work, and reports. Open only to teachers of vocational agriculture. Designed as a service course based upon the specific problems of teachers of vocational agriculture. By permission of the Graduate Council, teachers of vocational agriculture, by reason of their extended employment, will not be required to be in residence the entire term. Permission of the instructor.

Discussions, investigations, and reports will be planned and developed in those areas of needs as expressed by the teachers. Assignments in smaller groups will be made where needs so indicate.

†**803. The Problem Method Applied to Secondary and College Teaching in Agriculture.** Five credit hours. Winter Quarter. Permission of the instructor must be obtained. Mr. Stewart.

An inquiry into the conditions that promote effective teaching with a determination of procedures that contribute to this end. The possibilities of the problem method in agricultural education are fully explored.

*†**804. State Administration and Supervision of Vocational Agriculture.** Three credit hours. Spring Quarter. Three discussion periods each week. Mr. Fife.

A course devoted to a consideration of the following: federal and state legislation relating to vocational agriculture; state plans; records and reports; standards and objectives; teacher training in service; supervisory procedures; state courses of study; placement and recommendations of teachers; promotion of state program; day, evening, and part-time school organizations; and other problems relating to the state administration and supervision of vocational agriculture.

* Not given in 1946-1947.

† Not given during the academic year, 1946-1947.

†805. Developing Farming Programs for All-Day Students of Vocational Agriculture. Three credit hours. General prerequisites must include teaching experience in vocational agriculture or permission of the instructor. Students expecting to enroll in this course should communicate with the instructor at least three weeks prior to the beginning of the Quarter in order to arrange for the collection of data on specific problems. Mr. Kenestrick.

The selection, planning, conduct, and evaluation of programs, with emphasis on the analysis of project records in terms of efficiency factors, the use of comparisons to determine the association between practices followed and outcomes secured, and the utilization of the findings of such analyses and comparisons in teaching.

Not open to students who have credit for Agricultural Education 705.

*806. Organization and Administration of Teacher Training for Vocational Agriculture. Three credit hours. Winter Quarter. Five discussion periods each week. Mr. Stewart.

A course devoted to a consideration of the following: state plans for resident teacher training; working relations between teacher training departments and state supervisory organization; teacher training courses offered; analysis of the content of teacher training courses; provisions for observation and practice teaching; research in agricultural education; teacher placement and follow-up program.

†807. Evaluation and Measurement in Vocational Agriculture. Three credit hours.

This course is concerned with the development of objectives and the formulation of evaluative and measuring devices in vocational agriculture based upon such objectives. Particular attention will be given to recent progress in the evaluation of teaching, teacher-training, and supervisory programs.

*808. Organization and Methods of Conducting Part-Time and Evening Schools in Vocational Agriculture. Three credit hours. Winter Quarter. Three discussion periods each week. In addition to the general prerequisites, teaching experience in vocational agriculture or permission of the instructor is required. Students expecting to enroll in this course should communicate with the instructor at least two weeks prior to the beginning of the Quarter in order to arrange for the collection of data on specific problems.

A course devoted to an analysis of the problems related to part-time and evening schools in vocational agriculture and to the development of objectives and procedures in the organization and conduct of such instruction.

810. Seminar in Agricultural Education. Three to five credit hours. Autumn, Winter, and Spring Quarters. All instructors.

A study of current problems in agricultural education. Provision for investigation, reports and discussion.

950. Research for Teachers of Vocational Agriculture. Three credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include eight hours of graduate work. Mr. Fife.

A course devoted to a study of research techniques and procedures appropriate to studies and researches in the field of agricultural education. The course will direct students to a study of procedures in the promotion of research with individual projects in planning, organizing, and projecting appropriate studies.

Not open to students who have credit for Agricultural Education 809.

AGRICULTURAL ENGINEERING
Office, 105 Ives Hall

PROFESSORS McCUEN, MILLER, AND OVERHOLT

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

The general prerequisites include fundamental courses in agricultural engineering, agronomy, mathematics, and physics.

* Not given in 1946-1947.

† Not given during the academic year, 1946-1947.

602. Advanced Farm Structures. Five credit hours. Winter Quarter. Three recitations and two three-hour laboratory periods each week. General prerequisites must include courses in animal husbandry. Mr. Miller.

Advanced study of farm building programs, coordinating engineering, biological, economic and social factors. The general design and details of construction for units and entire farmsteads.

603. Advanced Farm Power Equipment. Five credit hours. Autumn Quarter. Three recitations and two three-hour laboratory periods each week. Mr. McCuen.

Trends in design and application of modern farm power equipment. The farm tractor and its complement of power equipment, such as combines, threshers, feed mills, corn harvesters, will be used as a basis in a study leading toward power programs for economical production.

604. Advanced Drainage and Irrigation. Five credit hours. Spring Quarter. Three recitations and four hours laboratory each week. In addition to the general prerequisites, a course in land surveying. Mr. Overholt.

Advanced study of conservation of soil by agricultural engineering structures to control erosion, and of soil water regulation through drainage and irrigation systems. A coordination of the biological, engineering, and economic factors involved in individual systems; also, cooperation problems in state and community programs for economic land utilization.

605. Advanced Field Machinery. Five credit hours. Spring Quarter. Three recitations and two three-hour laboratory periods each week.

An advanced study of soil-working, planting, and forage-handling machine from the mechanical, operational, and economic standpoint; including a term problem analyzing the machinery, power, and labor requirements and costs on the student's home (or other) farm.

701. Special Problems. Three to fifteen credit hours, taken in units of three or five hours each Quarter for one or more Quarters. Autumn, Winter, and Spring Quarters. All instructors.

Students selecting this course must have had at least two five-hour courses in the department, one of which must have been a 600 course in line with the problem chosen. Consent of the department must be secured.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

950. Research in Agricultural Engineering. Autumn, Winter, and Spring Quarters. Library, conference, and laboratory work. Permission of the department required. Mr. McCuen, Mr. Miller, Mr. Overholt.

AGRICULTURAL EXPERIMENT STATION

Wooster, Ohio

In recognition of the mutual objectives and research interests in the sciences contributing to the understanding and progress of agriculture, the Board of Trustees of The Ohio State University and the Board of Control of the Ohio Agricultural Experiment Station have authorized a co-operative program of graduate study and research.

1. Approved graduate seminars and research courses will be offered at the Ohio Agricultural Experiment Station as well as at The Ohio State University.

2. Courses which are to be offered both at the Ohio Agricultural Experiment Station and at The Ohio State University have been announced in the regular manner among the offerings of the appropriate department with the statement "Offered both at Columbus and at Wooster."

3. Members of the staff of the Ohio Agricultural Experiment Station are authorized to offer graduate courses and to act as advisers to graduate students, provided they satisfy the criteria of the Graduate Council and are approved by the graduate committee and the chairman of the appropriate department.

4. The rules of the Graduate School concerning residence credit will apply to students in residence at the Ohio Agricultural Experiment Station in the same way in which they apply to graduate students in residence on the campus of the University.

5. The graduate program of a student in residence at the Ohio Agricultural Experiment Station will be reviewed and approved by the graduate committee of the appropriate department just as if these students were on the University campus.

6. Graduate students anticipating credit for work done at the Experiment Station are required to register each Quarter and pay the usual fees assessed by the University.

This co-operative agreement makes available the advisory personnel and the extensive research facilities of the Ohio Agricultural Experiment Station as an integral part of the Graduate School.

For graduate courses offered at the Ohio Agricultural Experiment Station, reference is made to those departmental courses which include the insertion—"Offered at Columbus and at Wooster."

AGRICULTURAL EXTENSION

Office, 124 Townshend Hall

PROFESSORS RAMSOWER (DIRECTOR), SPOHN (SUPERVISOR OF PROJECTS AND PROGRAMS), AND PRICE (STATE LEADER OF HOME DEMONSTRATION WORK)

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

600. Extension Education. Five credit hours. Spring Quarter. Five recitations each week. Given in alternate years. Mr. Spohn.

The application of psychology and principles of education to the program and methods used in extension work.

701. Special Problems. Three to fifteen credit hours, taken in units of three or five hours each Quarter. Autumn, Winter, and Spring Quarters.

This course is intended for graduates who wish to work out problems in Agricultural Education including Agricultural Extension and Vocational Education in Agriculture.

FOR GRADUATES

800 and 900 Courses. A statement of the gneral prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

800. Extension Education. Three credit hours. Autumn, Winter, and Spring Quarters. Mr. Ramsower, Miss Price.

The course will deal with the program of Extension Education pertaining to organization of content and methods in the field of Extension.

The course will be organized for workers in the fields of Agricultural Extension and Home Economics Extension.

AGRONOMY

Offices, 102 Horticulture Building and 203A Townshend Hall

PROFESSORS LEWIS, CONREY, PARK, AND WILLARD, ASSOCIATE PROFESSORS LAMB AND PAGE, ASSISTANT PROFESSORS BATCHELOR AND SALTER

OHIO AGRICULTURAL EXPERIMENT STATION RESEARCH ASSOCIATES YODER, STRINGFIELD, SAYRE, VOLK, AND MORRIS

Research in Agronomy is concerned with fundamental investigations of the physical, chemical and biological proccesses and responses in soils and in field crops, and with the organization of the findings into scientific systems of soil management and of crop production.

Suggested areas of graduate specialization are: soil fertility, soil management, soil chemistry, soil physics, physical chemistry of soils, soil biology, soil genesis and morphology, soil conservation, field crop management, seed production, field crop ecology, field crop physiology, field crop breeding, and experimental methods in agronomy.

Prerequisites for Graduate Work: A student proposing to major in agronomy should have exhibited high undergraduate scholarship in such basic sciences as mathematics, chemistry, agricultural chemistry, physics, botany, genetics, and geology. If the undergraduate training is inadequate in any science fundamental to the proposed area of specialization, it will be necessary to make up the deficiency. A candidate for admission to graduate work in agronomy will find it advantageous to have a working knowledge of soils and field crops, though he need not have specialized in agronomy as an undergraduate.

Requirements for the Master's and Ph.D. Degrees: Each graduate student is required to prepare a statement of his proposed research according to the outline used for projects of the agricultural experiment stations. Once a year a progress report of the research, together with any modifications or revisions of the original project outline, is to be submitted to the departmental committee on graduate instruction.

Programs of candidates for the doctorate must be approved by the departmental committee on graduate instruction. Except in special cases, all "600" courses in the department are to be taken for credit. Candidates for the doctorate are expected to audit Agronomy 501, 502, and 508, unless these courses or thir equivalents have been taken previously.

Cooperation with the Ohio Agricultural Experiment Station: Association with the Ohio Agricultural Experiment Station provides facilities for laboratory and greenhouse investigations at Wooster as well as at Columbus and for field experiments at Wooster, Columbus, and at thirteen district and county experiment farms. Most of the graduate advisers in agronomy are also members of the staff of the Agricultural Experiment Station; several are full-time members.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

601. Organization of Soil and Crop Management Systems. Five credit hours. Winter Quarter. Three lectures and two discussion periods each week. Mr. Conrey, Mr. Lewis.

Recognizing, correlating and solving soil and crop problems relating to the improvement of soil resources and to efficient production and use of field crops. Practical application of chemical, physical, biological, and economic information and experience to the building of soil and crop management systems for various types of farming.

***602. Chemical Methods Used in Soils Investigation.** Five credit hours. Autumn Quarter. Two lectures and nine laboratory hours each week. Given in alternate years.

The fundamentals of inorganic quantitative analysis as applied to soils, fertilizers, and liming materials.

603. Origin and Classification of Soils. Five credit hours. Spring Quarter. Four lectures and one three-hour laboratory period each week. Mr. Conrey.

The characteristics of soils as developed under various climatic conditions and their application in soil classification with special reference to Ohio conditions. Laboratory study of soil characteristics, field trips to several of the important soil areas in Ohio.

604. Soil Erosion and Its Control. Five credit hours. Autumn Quarter. Four lectures and one three-hour laboratory period each week. Mr. Conrey.

A study of the nature, causes, occurrences and economic importance of soil erosion, and of the methods and agencies for its control. Field trips for study of erosion in different regions of the state with visits to erosion experiment station and demonstration control areas.

605. Soil Microbiology. Five credit hours. Autumn Quarter. Three lectures and two two-hour laboratory periods each week. Given in alternate years. Mr. Batchelor.

The isolation and study of the morphology of important soil microorganisms and of their biochemical transformations, such as nitrogen accumulation and loss, organic matter decomposition, oxidation and reduction, and their applications to practical soil management.

***607. Field Crop Breeding.** Five credit hours. Winter Quarter. Three two-hour lecture-laboratory periods each week. Given in alternate years. In addi-

* Not given in 1946-1947.

tion to the general prerequisites, a course in botany and a course in heredity. Mr. Lewis.

Applications of the science of genetics and the art of plant breeding to the improvement of field crops. Detailed studies of the basic principles and methods used in the development and selection of superior varieties, strains, and hybrids of grain, meadow and pasture crops. Emphasis is also given to the problems of obtaining effective and intelligent use of new and improved strains of field crops.

608. Soil Physics. Five credit hours. Winter Quarter. Three lectures and two three-hour laboratory periods each week. In addition to the general prerequisites, a course in physics. Mr. Page.

A study of the physical makeup and properties of soil, including structure, thermal relationships, consistency and plasticity, water and air relationships, and the nature of the colloidal fraction.

609. Physical Chemistry of Soils. Five credit hours. Spring Quarter. Three lectures and two three-hour laboratory periods each week. General prerequisites must include Agronomy 602 or 608. Mr. Page.

A study of the origin, nature and physico-chemical behavior of colloidal clay and organic matter in relation to soil acidity, base exchange and fixation of nutrients.

701. Special Problems. Three to fifteen credit hours. May be taken in units of three or five credit hours for one or more Quarters. Autumn, Winter, and Spring Quarters. The consent of the instructor is required. Offered at Columbus and Wooster. All instructors.

Eligible students may select special problems, not included in regular courses, and involving library, laboratory or field studies in soil fertility, soil management, soil chemistry, soil physics, soil biology, soil classification and mapping, soil conservation, field crop management, seed production, field crop breeding, construction and managemnt of turf areas, weed control, and experimental methods in agronomy.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

801. Agronomy Seminar. One to three credit hours. Autumn, Winter, and Spring Quarters. The consent of the instructor is required. Offered at Columbus and at Wooster.

Topics for 1946-1947:

Autumn Quarter: Applications of Colloidal Chemistry to Soils and Plants. Mr. Page.
Winter Quarter: Theories and Practices in Soil Fertility. Mr. Conrey, Mr. Yoder, Mr. Volk.
Spring Quarter: Ecology of Field Crops. Mr. Willard, Mr. Lewis.

950. Research in Agronomy. Autumn, Winter, and Spring Quarters. Offered at Columbus and at Wooster.

Research in soil fertility, soil management, soil chemistry, soil physics and physical chemistry, soil biology, soil genesis and morphology, and soil conservation under the direction of Mr. Conrey, Mr. Yoder, Mr. Page, Mr. Salter, Mr. Volk, Mr. Batchelor.

Research in field crop breeding, field crop management, seed production, field crop ecology, field crop physiology, and experimental methods in Agronomy, under the direction of Mr. Lewis, Mr. Willard, Mr. Park, Mr. Stringfield, Mr. Sayre, Mr. Lamb, Mr. Morris.

AMERICAN CIVILIZATION

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the hading, "DEPARTMENTS OF INSTRUCTION," page 46.

601-602-603. American Civilization. Two credit hours each Quarter. Autumn, Winter, Spring. Open only to students in American Civilization. Mr. Charvat, Mr. Dulles.

A conference course integrating the work of American Civilization majors in the allied fields of American history, economics, political science, art and literature. Emphasis upon the intellectual background of our national developments, the growth of institutions, and the rise of a distinctively American culture as expressd in literature, music, and art.

701-702-703. American Civilization. Two credit hours each Quarter. Autumn, Winter, Spring. Open only to students in American Civilization.

A further conference course with emphasis upon contemporary aspects of American culture. Present-day concepts of democracy and questions relating to political organization, economic relations, and racial problems. Literature, art and music as an expression of the American spirit.

AMERICAN HISTORY
(See History)

ANATOMY
Office, 410 Hamilton Hall

PROFESSORS KNOUFF, BAKER, EDWARDS, AND PALMER, ASSOCIATE PROFESSORS SETTERFIELD, GRAVES, AND OSBORN, ASSISTANT PROFESSOR KIRK, MR. FOULKS, MR. RALPH

General prerequisites for graduate work in anatomy:

1. An undergraduate major in anatomy or its equivalent is the minimum requirement for graduate work in the Department. The College of Arts and Sciences requires a minimum of 40 Quarter hours in the major field during the last two years in college and permits a maximum of 60 hours in the major field.

2. The course requirements for an undergraduate major in anatomy, of which 25 hours must be in Anatomy, are as follows:

a. Required courses
   Anatomy 613, 616, 619
b. Elective courses in anatomy
   Anatomy 617, 650, 604, 701, 611
c. Elective courses in allied fields
   Physiology 626, 627, 628
   Bacteriology 607, 655, 656, 657, 658, 617, 618, 619
   Zoology 601, 509, 610, 605, 617, 618, 620
   Psychology 601, 602, 603, 610, 611, 622, 624, 634, 641
   Sociology 501
   Physiological Chemistry 611, 612, 613

Students from schools other than Ohio State University should evaluate their offerings in terms of the courses listed above. No graduate credit in the Department of Anatomy is given for Anatomy 613, 616, or 619. Graduate credit is given for courses in the B group which have not been used to fulfill the requirements for an undergraduate major.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

604. Anatomical Methods. Three or five credit hours. One Quarter. Autumn and Spring. One conference and the equivalent of four or eight laboratory or study hours each week. Mr. Knouff.

This course is designed for and limited to anatomy majors desiring to begin investigative work.

A study of the various techniques employed in anatomical research. Permission of the adviser must be secured.

611. Comparative Histology. Five credit hours. Autumn Quarter. Two lectures and nine laboratory hours each week. General prerequisites must include Anatomy 616, or Zoology 617 and 620. Enrollment is limited to twenty-five students and the permission of the instructor is required. Mr. Osborn.

A general consideration of the fundamental animal tissues. Available invertebrate material will be examined although special emphasis will be placed on the vertebrate forms.

613. Comparative Anatomy of the Vertebrates. Five credit hours. Autumn Quarter. Two lectures or recitations and two three-hour laboratory periods each week. General prerequisites must include elementary courses in zoology. Mr. Setterfield.

The comparative anatomy of the Elasmobranchs, Amphibians, and mammals as illustrated by the shark, frog, and fetal pig.

616. Comparative Vertebrate Embryology. Five credit hours. Spring Quarter. Three lectures or recitations and two three-hour laboratory periods each week. General prerequisites must include Anatomy 619 or its equivalent. Mr. Knouff, Mr. Foulks.

The development of the chick and pig with special emphasis on fetal membrane formation and organogenesis.

617. Elementary Neurology. Five credit hours. Autumn Quarter. Two lectures or recitations and nine laboratory hours each week. General prerequisites must include Anatomy 611 or equivalent. Mr. Setterfield.

A brief review of the brain and cranial nerves of the shark; the morphology of the spinal cord and brain of a mammal; the principal tracts and nuclei (reaction systems) of the cord and brain with special reference to the human nervous system.

619. Comparative Anatomy of the Vertebrates. Five credit hours. Winter Quarter. Two lectures or recitations and six laboratory hours each week. General prerequisites must include Anatomy 613 or equivalent. Mr. Setterfield.

The anatomy of the mammals with special reference to the cat.

621-622-623. Human Anatomy. Five credit hours. Autumn, Winter, and Spring Quarters. Two lectures or recitations and ten laboratory hours each week. Open only to students in medicine and to students doubly registered in the College of Medicine and the Graduate School. Mr. Baker, Mr. Graves.

The gross anatomy of the thorax and abdomen; of the extremities and perineum; of the head and neck.

624. Histology. Five credit hours. Autumn Quarter. Two recitations, one lecture, and nine laboratory hours each week. Open only to students in medicine and to students doubly registered in the College of Medicine and the Graduate School. Mr. Knouff, Mr. Osborn, Mr. Foulks, Mr. Ralph.

The general histology of epithelial, connective, blood, and nervous tissues and the vascular system.

625. Histology. Five credit hours. Winter Quarter. Two recitations, one lecture, and nine laboratory hours each week. Open only to students in medicine and to students doubly registered in the College of Medicine and the Graduate School. Mr. Knouff, Mr. Osborn, Mr. Foulks, Mr. Ralph.

Special histology and embryology of the integumentary, digestive, respiratory, urogenital, and endocrine systems.

626. Neuro-Anatomy. Five credit hours. Spring Quarter. Two recitations, one lecture, and nine laboratory hours each week. Open only to students in medicine and to students doubly registered in the College of Medicine and the Graduate School. Mr. Palmer.

The gross anatomy and histology of the nervous system including sense organs with special reference to the reaction systems.

628. Special Advanced Anatomy. Three credit hours. One Quarter. Autumn, Winter, Spring. One conference or lecture and six laboratory hours each week. General prerequisites must include Anatomy 623 or 633, or 639 and the consent of the instructor is required. Open only to students registered in the College of Medicine or Dentistry and to students doubly registered in the College of Medicine or Dentistry and the Graduate School. Mr. Edwards, Mr. Graves.

Students will select or have assigned to them special regions for dissection and study.

630. Neurology. Three credit hours. Autumn Quarter. One lecture and six laboratory hours each week. Open only to students registered in Dentistry and to students doubly registered in the College of Dentistry and the Graduate School. Mr. Setterfield.

The gross and microscopic structure of the brain and spinal cord, with special stress on the general principles of neurology, including nervous tissue.

631. Human Anatomy. Five credit hours. Autumn Quarter. Two lectures or recitations and nine laboratory hours each week. Open only to students registered in Dentistry and to students doubly registered in the College of Dentistry and the Graduate School. Mr. Edwards.

The gross anatomy of the upper and lower extremities with special stress on the general principles of anatomy including osteology, myology, syndesmology, angiology, and dermatology.

Not open to students who have credit for Anatomy 638-639.

632. Human Anatomy. Five credit hours. Winter Quarter. Two lectures or recitations and nine laboratory hours each week. Open only to students registered in Dentistry and to students doubly registered in the College of Dentistry and the Graduate School. Mr. Edwards.

The gross anatomy of the head and neck with special stress on osteology of the skull, muscles of mastication, trigeminal nerve, temporomandibular joint and mouth in relation to dentistry.

Not open to students who have credit for Anatomy 638-639.

633. Human Anatomy. Four credit hours. Spring Quarter. Two lectures or recitations and six laboratory hours each week. Open only to students registered in Dentistry and to students doubly registered in the College of Dentistry and the Graduate School. Mr. Edwards.

The gross anatomy of the thorax and abdomen with special stress on descriptive, topographical and applied anatomy of the viscera.

Not open to students who have credit for Anatomy 638-639.

634. Histology. Four credit hours. Winter Quarter. Two lectures or recitations and six laboratory hours each week. Open only to students registered in Dentistry and to students doubly registered in the College of Dentistry and the Graduate School. Mr. Knouff, Mr. Osborn.

General histology of the tissues and special histology of the Integumentary system and of the eye and ear.

Not open to students who have credit for Anatomy 640.

635. Histology. Two credit hours. Spring Quarter. One lecture or recitation and three laboratory hours each week. Open only to students registered in Dentistry and to students doubly registered in the College of Dentistry and the Graduate School. Mr. Knouff, Mr. Osborn.

Special histology of the vascular, respiratory, digestive, endocrine and urogenital systems.

Not open to students who have credit for Anatomy 640.

641. Topographical Anatomy. One credit hour. Autumn Quarter. Three hours of laboratory including lecture or quiz each week. General prerequisites must include Anatomy 631, 632, 633, 634, and 635. Open only to students in Dentistry and to students doubly registered in the College of Dentistry and the Graduate School. Mr. Edwards, Mr. Trippy.

The topographical relations of structure of the head and neck as displayed by prepared sections, museum demonstrations, models, roentgenograms and correlated dissections with special attention to intimate correlation of the subject matter with operative dentistry.

650. A Survey of Anatomy. Five credit hours. Spring Quarter. Two lectures, one discussion period and six laboratory or library hours each week. General prerequisites must include four Quarters in Anatomy. Recommended for anatomy majors. The staff.

The objectives of this course are first to survey the history and development of anatomical knowledge and second, to correlate the subject matter of anatomy and associate major advances in the field of anatomy with the leading investigators. Present day trends in anatomical research will be discussed and an attempt made to introduce students to accepted procedures in original investigation.

700. Clinical Anatomy. Two credit hours. Autumn Quarter. One lecture or recitation and two laboratory hours each week. General prerequisites must

include Anatomy 621, 622, and 623. Open only to students in medicine and to students doubly registered in the College of Medicine and the Graduate School. Mr. Graves.

Topographical and regional aspects of human anatomy as displayed by prepared sections, special dissections, museum demonstrations, and roentgenograms, with special reference to the correlation of structure and clinical manifestations.

701. Minor Problems in Anatomy. Three to five credit hours. Autumn, Winter, and Spring Quarters. One conference and four to eight laboratory and/or library hours each week. General prerequisites must include the equivalent of a major in anatomy or allied departments. The staff.

This course is designed to permit any properly qualified person to avail himself of the library and laboratory facilities of the department for carrying out a minor investigation or for adding to his knowledge and technique in some anatomical subject.

721-722-723. Primate Anatomy. Five credit hours. Autumn, Winter, and Spring Quarters. Two lectures or recitations and ten laboratory hours each week. Permission of the instructor is required. Mr. Edwards, Mr. Graves.

A regional and systemic study of the primate body for advanced students of Comparative Morphology with special reference to the ontogenetic and phylogenetic history of the organ systems.

724. Advanced Mammalian Histology. Five credit hours. Autumn Quarter. Two recitations, one lecture, and nine laboratory hours each week. Permission of instructor is required. Mr. Knouff.

The general histology of epithelial, connective, blood, and nervous tissues and the vascular system.

725. Advanced Mammalian Histology. Five credit hours. Winter Quarter. Two lectures, one recitation, and nine laboratory hours each week. Permission of instructor is required. Mr. Knouff.

The special histology and embryology of the integumentary, digestive, respiratory, urogenital, and endocrine systems.

726. Neurology. Five credit hours. Spring Quarter. Two recitations, one lecture, and nine laboratory hours each week. Permission of the instructor is required. Mr. Palmer.

The subject matter included in this course is chiefly concerned with the gross morphology, microscopic structure and the reaction systems of the primate nervous system and sense organs

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

807. Special Problems in Anatomy. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. Permission of the instructor is required.

The student will select or be assigned special topics in one of the following fields of Anatomy:

(a) Problems in endocrinology. Mr. Osborn.
(b) Special studies in blood and connective tissues. Mr. Knouff.
(c) Special studies in embryology. Mr. Knouff, Mr. Foulks.
(d) Advanced comparative morphology. Mr. Edwards, Mr. Setterfield.
(e) Problems in microscopic anatomy. Mr. Knouff.
(f) Special studies in neurology. Mr. Palmer.

830. Anatomy Seminar. One credit hour. Autumn, Winter, and Spring Quarters. Required of all candidates for the Doctor's degree in anatomy during the second year in the Graduate School and thereafter. Mr. Knouff, Mr. Edwards, Mr. Setterfield.

This course consists of discussions of research in progress and reports from the literature of current anatomical problems.

950. Research in Anatomy. All Quarters. General prerequisites must include the equivalent of a major in anatomy, including Anatomy 604 and 701. The staff.

ANCIENT HISTORY AND LITERATURE

A program leading to the degree of Master of Arts may be arranged in the combined fields of Ancient History and the Classical Languages. Such a program must be approved by Mr. McDonald of the Department of History, Mr. Titchener of the Department of Classical Languages, and the Dean of the Graduate School.

ANIMAL HUSBANDRY

Office, 203 Plumb Hall

PROFESSORS KAYS, GAY, COFFEY, SALISBURY, AND SUTTON,
ASSOCIATE PROFESSOR KUNKLE

All work leading to a graduate degree in this department shall be done under the supervision of a graduate committee which shall consist of the chairman of the department, a member of the staff chosen by the chairman and the student's adviser. This committee shall pass on a candidate's fitness for the work, prescribe his course, and approve his thesis plans before he proceeds.

The areas of specialization for graduate work in the Department of Animal Husbandry are animal nutrition, animal genetics, animal production and meats.

For unconditional admission to graduate work in this department, a student must have an accumulative point hour ratio of 8 or better (an average of B or better) in his undergraduate studies.

Basic prerequisites for all undergraduate students in Animal Husbandry shall include acceptable courses in physiology. In addition students interested in animal nutrition should have credit in academic courses in agricultural or biological chemistry equivalent to Agricultural Chemistry 601; those interested in animal genetics should have credit in academic courses equivalent to Zoology 403.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

GENERAL LIVE STOCK PRODUCTION

608. Live Stock Marketing. Five credit hours. Winter Quarter. Five lectures each week. General prerequisites must include a course in feeding live stock and Rural Economics 613. Mr. Henning.

The various agencies and organizations involved in the marketing of live stock will be studied. Methods of selling, basis of sale, choice of markets, grade price differentials will be reviewed. The problems of transportation and financing will be considered. Emphasis will be placed on recent developments, concentration, direct to packer marketing, costs of marketing, management, public relations and other problems in live stock marketing.

***611. Advanced Live Stock Breeding.** Five credit hours. Winter Quarter. Three lectures and two two-hour laboratory periods each week. General prerequisites must include a course in heredity, a course in breeding live stock, and permission of the instructor.

The function of the progeny test as a tool for measuring the genetic potentialities of sires and dams; pedigree analysis and other aids to selection; systems of breeding; the utilization of artificial insemination as a means for more rapid live stock improvement; discussions of recent contributions and research in animal breeding.

DAIRY PRODUCTION

614. Methods and Techniques in Animal Husbandry Investigations. Five credit hours. Autumn Quarter. Three lectures and one four-hour laboratory period each week. General prerequisites must include twenty hours in animal husbandry courses and permission of instructor in charge. Mr. Sutton.

A course designed to cover the experimental work being pursued at the leading experiment stations. Experimental procedures of nutrition, milk secretion and reproduction studies.

* Not given in 1946-1947.

616. Dairy Inspection Trip. No credit hours. An inspection trip of approximately two weeks, without credit, will be required of all students specializing in dairy production. Mr. Salisbury.

The purpose of this inspection trip is to study at first hand the leading breeding herds, commercial dairies and research programs in operation in the Eastern part of the country.

626. Marketing of Dairy Products. Three credit hours. Winter Quarter. Two lectures each week. General prerequisites must include Rural Economics 613. Mr. McBride.

A study of assembling, transportation and marketing of dairy products, with special reference to Ohio. Attention will be given to changing market areas, producers' cooperative movements and manufacturers' consolidation activities. One or two inspection trips of two or three days will be made.

SPECIAL PROBLEMS

GENERAL LIVE STOCK PRODUCTION AND DAIRY PRODUCTION

701. Special Problems. Three to fifteen credit hours. Given in units of three to five hours a Quarter for one or more Quarters. Autumn, Winter, Spring. Offered at Columbus and at Wooster. Mr. Gay, Mr. Kays, Mr. Coffey, Mr. Salisbury, Mr. Sutton, Mr. Kunkle.

Special assignments in the advanced phases of any of the lines of animal and dairy production and meats. Students will elect work in desired subjects after conference with the instructor in charge.

NOTE: Student desiring work in animal nutrition, see Agricultural Chemistry 601 and 607.

†705. Meats and Dairy Cattle Production (For teachers of Vocational Agriculture). Four credit hours. Prerequisite, Animal Husbandry 402 and teaching experience. Summer Quarter only. Four hours daily, to be divided between Meats and Dairy Cattle Production. Enrollment to be determined by facilities available. Mr. Kunkle, Mr. Salisbury.

The Meats offering includes laboratory and discussion sessions on meat and meat products. Grading, identification of cuts and utilization methods of all grades of beef, pork, veal, and lamb receive appropriate consideration.

The course in Dairy Cattle Production deals with the economic importance of the breeds, the management of dairy herds, modern testing and breeding methods and their application in a program of improved dairy farming practice.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

This will include at least two years' study of the types and breeding of live stock with collateral work in the principles of breeding, feeding and management.

950. Research in Animal Husbandry. Autumn, Winter, and Spring Quarters. Offered at Columbus and at Wooster.

Research work in Animal Husbandry is conducted under the direction of Mr. Gay, Mr. Kays, Mr. Coffey; in Dairy Production under the direction of Mr. Salisbury; in Nutrition under the direction of Mr. Sutton; and in Meats under the direction of Mr. Gay, Mr. Kunkle.

ARCHITECTURE AND LANDSCAPE ARCHITECTURE

Office, 119 Brown Hall

PROFESSORS RONAN, CHUBB, BAUMER, AND SMITH, ASSOCIATE PROFESSORS FISCHER, OMAN, SUTTON, AND THOMPSON

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," see page 46.

† Not given during the academic year, 1946-1947.

ARCHITECTURE

770-771-772. Architecture: Special Studies in Architecture. One to five credit hours. Autumn, Winter, and Spring Quarters. All instructors.

These courses are open by permission of the department to graduate students desiring to pursue special studies not offered in the fixed curricula.

LANDSCAPE ARCHITECTURE

701. Landscape Architecture: Special Problems. Two to ten credit hours. Autumn, Winter, and Spring Quarters. Prerequisite, third or fourth year standing. Mr. Sutton.

This course is open, by permission of the department, to students in the Graduate School and those who wish to pursue special studies in landscape architecture and architecture not offered in the fixed curricula.

ART

(See Fine Arts)

ASTRONOMY

(See Physics and Astronomy)

BACTERIOLOGY

Office, 210 Pharmacy and Bacteriology Building

PROFESSORS HUDSON, MORREY (EMERITUS), STARIN, AND WOOLPERT, ASSOCIATE PROFESSORS BIRKELAND, MARKHAM, AND STAHLY, ASSISTANT PROFESSOR WEISER, MISS HEISE

Requirements for the Master's Degree: (a) The course requirements for the Master's degree are not rigidly fixed, but in addition to his major work the candidate should take courses in fundamental biology, chemistry (organic and physiological), comparative anatomy, physics and mathematics. The choice and number of allied courses are arranged by conferring with the adviser and depend on the student's field of specialization in bacteriology and on his previous training. (b) A thesis based on independent research is required as a part of the student's scientific training. (c) The candidate must pass a written preliminary examination, dealing with the material of the basic courses in bacteriology and allied sciences, before the end of the second Quarter preceding the Quarter of expected graduation. (d) Final written and oral examinations must be passed at least two weeks before the date of graduation and after the submission and approval of the student's thesis.

Requirements for the Degree Doctor of Philosophy: (a) In order to be considered worthy of undertaking work toward the Doctor's degree, a student must display notable ability in bacteriology and allied sciences, an aptitude in research, and facility in the use of the English language. To demonstrate the student's fitness in these respects, the Department may require an examination. (b) An advisory committee is appointed for each student to aid in arranging his program and in carrying it to completion. The sequence of courses to be taken in the Department and the choice of work in allied fields depend on the student's previous training and objectives. An understanding of the basic techniques and concepts of biology, chemistry, physics, and mathematics is required. Ordinarily not more than one-third of the credit hours toward the degree should originate outside the Department. (c) The student must pass the language requirements of the Graduate School before appearing for a preliminary examination. (d) The student is required to pass a preliminary oral examination covering the fundamentals of bacteriology and allied sciences not later than the fifth Quarter preceding the Quarter of graduation. The general examination and the final examination are taken in accordance with regulations of the Graduate School. (e) The dissertation, embodying the research of the candidate must represent a contribution to science and be of a publishable grade of excellence. It must be submitted to the advisory committee not less than six weeks prior to the date of graduation. If accepted by the committee, it is transmitted to the Dean of the Graduate School for approval. Two final copies of the dissertation and an abstract must be deposited in the office of the Graduate School and one copy of each with the advisory committee.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

The prerequisites for all courses in this group consist of ten hours of biological sciences and fifteen hours of chemistry in addition to any other prerequisites stated in the descriptions of the courses.

Students intending to specialize in bacteriology should take in addition to their major work courses in botany, zoology, organic and physiological chemistry, physics, physiology,

comparative anatomy, histology, pathology, dairy technology, or agronomy, depending upon the student's field of interest in bacteriology and his previous training.

607. General Bacteriology. Five credit hours. One Quarter. Autumn and Spring. Two lectures, one recitation, and three two-hour laboratory periods each week. Mr. Stahly, Mr. Weiser.

This course is a prerequisite to all elective courses in the department and is designed to prepare for special work. The lectures consider the botanical relationships of bacteria, their morphology, classification, effect of physical and chemical environment, action on food material, etc. The laboratory work includes preparation of the ordinary culture media and making of cultures on these media, staining methods, and some typical biochemical actions.

Not open for graduate credit to students majoring in bacteriology.

608. Introduction to Pathogenic Bacteriology. Three credit hours. Spring Quarter. Three class periods each week. General prerequisites must include Bacteriology 607. Mr. Birkeland.

A general course designed to acquaint students with those bacteria causing disease in man, their habitats and modes of transmission, and an elementary consideration of the immunological processes involved. Designed primarily for students who desire a general knowledge of the field and not for students majoring in bacteriology.

610. Dairy Bacteriology. Three credit hours. Winter Quarter. Three class periods each week. General prerequisites must include Bacteriology 607. Mr. Weiser.

Sources and kinds of bacteria in milk and in normal milk fermentation. Uses of bacteria in butter making, and of bacteria and fungi in cheese making. Bacteria involved in unnatural milk fermentation and methods of control.

611. Dairy Bacteriology. Three credit hours. Winter Quarter. Three two-hour laboratory periods each week. Bacteriology 607 and 610 must be included in the general prerequisites. However, 610 may be taken concurrently. Mr. Weiser.

Laboratory work on the organisms discussed in Bacteriology 610.

614. Bacteriology of Food, Water, and Sewage. Five credit hours. Winter Quarter. Three class periods and three two-hour laboratory periods each week. General prerequisites must include Bacteriology 607. A previous course in pathogenic bacteriology is recommended or may be taken concurrently. Mr. Weiser.

A study of the effects of microorganisms on foods, and methods of food preservation. Bacterial flora of water and sewage in relation to water purification and sewage disposal.

Particular emphasis is placed upon the role of sanitation and public health regulations in the control of infectious diseases transmitted through food, water, and sewage.

617. Immunology. Three credit hours. One Quarter. Autumn and Spring. Three class periods each week. General prerequisites must include Bacteriology 607, 655, or equivalent. Mr. Starin, Mr. Markham.

A discussion of the general principles of immunity, including toxins and antitoxins, bactericidal substances, agglutinins, precipitins, opsonins, etc.

618. Immunology. Three credit hours. One Quarter. Autumn and Spring. Three three-hour laboratory periods each week. General prerequisites must include Bacteriology 607, 655, or equivalent. Mr. Starin, Mr. Markham.

Laboratory work in the preparation of toxins, antitoxins, antibacterial substances, bacterial vaccines, and in the serological methods of diagnosis.

619. Pathogenic Protozoology. Three credit hours. Spring Quarter. Three class periods each week. General prerequisites must include Bacteriology 607, 608, and 609, or equivalents. Mr. Markham.

The various pathogenic protozoa of man and domestic game animals are considered, with special attention to amebae and plasmodia of malaria. Emphasis is placed on the principles of parasitism involved and on insect transmission.

633. Advanced General Bacteriology. Five credit hours. Spring Quarter. Two lectures, one recitation, and three two-hour laboratory periods each week. General prerequisites must include Bacteriology 607. Mr. Stahly.

A course concerned with an advanced and detailed study of the basic phenomena of bacterial morphology, composition, growth, cultivation, variation, and classification.

635. Physiology of Bacteria. Three credit hours. Autumn Quarter. Three class periods each week. General prerequisites must include Bacteriology 607, 655, 656, 657, 658 or equivalents and two Quarters of organic chemistry. Mr. Stahly.

Studies of bacterial metabolism including enzymes, mechanisms of biochemical changes and products. Uses of bacteria in fermentation industries.

649. Filterable Viruses. Three credit hours. Spring Quarter. Three lectures each week. General prerequisites must include Bacteriology 607, 655, 656, 657, 658, 617, and 618, or equivalents. Mr. Hudson.

Lecture and demonstration course on the nature and action of filterable viruses as ultramicroscopic parasites of man, animals and plants.

655. Pathogenic Bacteriology. Three credit hours. Winter Quarter. Three class periods each week. General prerequisites must include Bacteriology 607. Miss Heise.

A study of some of the important organisms causing disease in man. Modes of transmission, methods of protection against infections, and immunological relationships. Designed for students majoring in bacteriology, those preparing for work in diagnostic laboratories, and others desiring a more comprehensive knowledge than is provided in Bacteriology 608.

Not open to students who have credit for Bacteriology 608.

656. Pathogenic Bacteriology. Three credit hours. Winter Quarter. Three three-hour laboratory periods each week. General prerequisites must include Bacteriology 607. Miss Heise.

Laboratory work with some important bacteria causing disease in man. Includes study of the cultural and staining characteristics, methods of identification and diagnosis, and animal experimentation. Designed to accompany Bacteriology 655.

Not open to students who have credit for Bacteriology 609.

657. Pathogenic Bacteriology. Three credit hours. One Quarter. Autumn and Spring. Three class periods each week. Designed for students majoring in bacteriology. General prerequisites must include Bacteriology 607, 655, and 656, or equivalents. Miss Heise.

A continuation of Bacteriology 655, including a study of those organisms pathogenic for man, not covered in the preceding course. Modes of transmission, methods of protection against infection, and immunological relationships. Lectures, conferences, and reports.

Not open to students who have credit for Bacteriology 625 or 631.

658. Pathogenic Bacteriology. Three credit hours. One Quarter. Autumn and Spring. Three three-hour laboratory periods each week. General prerequisites must include Bacteriology 607, 655, and 656, or equivalents. Concurrent with Bacteriology 657. Miss Heise.

A continuation of Bacteriology 656.

Not open to students who have credit for Bacteriology 625 or 632.

701. Minor Investigations. One to five credit hours each Quarter. Autumn, Winter, Spring. A student may enter at the beginning of any Quarter. General prerequisites must include Bacteriology 607, 655, 656, 657, 658, 617, and 618, or equivalents. Department staff.

This course is designed for such students as have completed the equivalent of two years' work in bacteriology and are still undergraduates. The work will be outlined by the instructor in charge to meet the individual student's needs.

710. History of Bacteriology and Allied Fields. Three credit hours. Spring Quarter. Lectures, conferences, and library work. General prerequisites

must include advanced graduate standing in bacteriology or permission of the instructor. Mr. Starin, Mr. Markham.

This course is designed for students majoring in bacteriology. Its purpose is to acquaint the student with the historical development of bacteriology, immunology, and allied fields, to introduce him to the principal workers in the various fields, and to show how their contributions are related to our present concepts.

Not open to students who have credit for Bacteriology 624.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

807-808-809. Seminar in Bacteriology. One credit hour. Autumn, Winter, and Spring Quarters. Required of all graduate students majoring in bacteriology. Department staff.

950. Research in Bacteriology. Autumn, Winter, and Spring Quarters. General prerequisites must include acceptable courses in the chosen field of research. Department staff.

BOTANY

Office, 102 Botany and Zoology Building

PROFESSORS TRANSEAU, STOVER, SAMPSON, MEYER, BLAYDES AND ALLISON, ASSOCIATE PROFESSORS WALLER AND TAFT, ASSISTANT PROFESSORS LAMPE AND WOLFE, MR. NORRIS

Requirements for Advanced Degrees: In addition to the requirements of the Graduate School, candidates for the Master's degree should have had, prior to taking the comprehensive examination, acceptable courses in general botany, general zoology, local flora, plant physiology, plant morphology, ecology, plant pathology, and organic or biological or agricultural chemistry. Additional courses required will depend upon the student's field of specialization, and will be decided upon in consultation with the student's adviser.

Candidates for the Doctor's degree, in addition to meeting the language and other requirements of the Graduate School, and the course requirements for the Master's degree, must select, in consultation with their advisers, such additional courses in botany and other science departments as will form a broad foundation for research in plant science.

Students may specialize in certain phases of plant physiology, morphology, pathology, ecology, genetics, and taxonomy.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

601. Plant Ecology. Five credit hours. Autumn Quarter. Three lectures and one three-hour laboratory period each week. Mr. Transeau, Mr. Wolfe.

Patterns of vegetation, local, regional and continental; and the historic, climatic, soil, and plant factors that limit the various plant communities. Lectures, discussions, and laboratory work on tundra, boreal forest, hemlock-hardwood, and deciduous forest. Field study of Ohio plant communities and their successions. Several extended Saturday field trips.

602. Plant Ecology. Five credit hours. Spring Quarter. Three lectures and one three-hour laboratory period each week. General prerequisites must include Botany 601. Mr. Transeau, Mr. Wolfe.

Continuation of Botany 601. The forest, grassland, and desert vegetation of western North America. Lectures, reference reading and laboratory work. Further study of Ohio plant communities. Several extended Saturday field trips.

605. Plant Physiology. Five credit hours. One Quarter. Autumn and Winter. Three lectures and two two-hour laboratory periods each week. Mr. Meyer.

A fundamental course in plant physiology: solutions, colloidal systems, cell physiology, diffusion phenomena, osmotic quantities, permeability, transpiration, absorption and movement of water, photosynthesis.

606. Plant Physiology. Five credit hours. One Quarter. Autumn, Winter, Spring. Three lectures and two two-hour laboratory periods each week. General prerequisites must include Botany 605. Mr. Meyer.

Continuation of Botany 605: photosynthesis, syntheses of carbohydrates, fats, and nitrogenous compounds, absorption and utilization of mineral salts, digestion, translocation of solutes, respiration, growth, reproduction, dormancy.

611. Evolution of Plants. Three credit hours. Spring Quarter. Lectures and assigned readings. Miss Lampe.

The fossil record of plants of the past, followed by a study of trends in the differentiation of plants as shown by variations in form, structure, physiology, and chemical constitution. The cellular basis of heredity, stability, and variation. The effects of environments and circumstances on survival.

613. General Morphology of Thallophytes and Bryophytes. Five credit hours. Autumn Quarter. Four two-hour laboratory periods each week. Mr. Blaydes.

A study of the life cycles of bacteria, algae, fungi, liverworts and mosses. Comparative and experimental studies using numerous species of the several groups for demonstrating the reproductive processes and tracing evolutionary developments.

614. General Morphology of the Pteridophytes and Spermatophytes. Five credit hours. Winter Quarter. Four two-hour laboratory periods each week. Miss Lampe.

A study of the comparative structures and life histories of the ferns, gymnosperms, and angiosperms, giving particular attention to the structure and development of seed plants.

615. Plant Microtechnic. Five credit hours. Winter Quarter. Two lectures and three two-hour laboratory periods each week. Mr. Blaydes.

Principles and methods of fixing, imbedding, sectioning and staining of plant tissues for permanent microscopic preparations. Opportunity is given for preparing a collection of microscope slides suitable for use in teaching. Students having research materials may use these in making microscopic preparations.

619. Economic Botany. Five credit hours. Winter Quarter. Four lectures and one two-hour laboratory period each week. Desirable, concurrently or as antecedent, ecology or advanced geography. Consult instructor before registering. Mr. Waller.

The plant sources of sugars, fats, proteins, fibers, rubber, and wood products. Related problems of production and distribution are illustrated and discussed. Field trips to distributing centers are scheduled when possible.

635. Plant Genetics. Five credit hours. Spring Quarter. Five recitations each week. General prerequisites must include a course in heredity. Mr. Waller.

Variations in plants; their inheritance. Application of inheritance studies to practical problems of plant breeding.

637. Plant Cytology. Three credit hours. Spring Quarter. Three two-hour laboratory periods each week. General prerequisites must include four Quarters of biology. Given biennially, alternating with Botany 640. Miss Lampe.

The colloidal nature and chemistry of cell organs in living and fixed condition. Effects of various chemicals upon protoplasmic structure. Ontogeny, structure, divisions and fusions of plant cells. Chromosome structure and behavior; chromosome and gene mutations.

NOTE: Either Botany 637 or 640 will be given in 1946-1947, depending on the relative number of applications. Students planning to take either course should consult Mr. Blaydes.

640. Plant Anatomy. Three credit hours. Spring Quarter. Three two-hour laboratory periods each week. General prerequisites must include four Quarters of biology. Given biennially, alternating with Botany 637. Mr. Blaydes.

The initiation, differentiation and development of tissues, tissue systems and organs of vascular plants, and a comparative study of the various structures. This course is a desirable antecedent to advanced work in plant physiology, pathology and morphology.

NOTE: Either Botany 637 or 640 will be given in 1946-1947, depending on the relative number of applications. Students planning to take either course should consult Mr. Blaydes.

645. Principles of Taxonomy: Pteridophytes and Gymnosperms. Three credit hours. Autumn Quarter. Three two-hour laboratory periods each week. General prerequisites must include Botany 614 or its equivalent. Given biennially, alternating with Botany 646. Miss Lampe.

A study of the origin and evolution of the ferns and gymnosperms, and a general consideration of the origin of the angiosperms. An analysis of the basic heritable variations among the plants in these groups.

***646. Principles of Taxonomy: Monocots and Dicots.** Three credit hours. Autumn Quarter. Three two-hour laboratory periods each week. General prerequisites must include Botany 614 or its equivalent. Desirable antecedent, Botany 645. Given biennially, alternating with Botany 645. Miss Lampe.

The progressive development of characters in the monocots and dicots.

653. Mycology. Three credit hours. Autumn Quarter. Three two-hour laboratory periods each week. Mr. Stover.

Study of the classification, structure, reproduction, and life histories of the Basidiomycetes, including the rusts and smuts. Collection and identification of fungi available during the autumn months, edible and poisonous mushrooms, wood-destroying fungi, and other interesting species.

654. Mycology. Three credit hours. Spring Quarter. Three two-hour laboratory periods each week. Mr. Stover.

Study of the classification, structure, reproduction, and life histories of the Myxomycetes, Phycomycetes, Ascomycetes, Deuteromycetes, and Lichens. Attention is given to the collection and identification of the fungi available during the spring months, including molds, mushrooms, and plant disease fungi.

656. Advanced Plant Pathology. Three credit hours. Winter Quarter. Three two-hour laboratory periods each week. Mr. Stover.

Designed for students in botany, entomology, horticulture, and agronomy. Each student may select for study the diseases of those plants in which he is primarily interested.

665. Freshwater Algae. Three credit hours. Spring Quarter. Three two-hour laboratory periods each week. General prerequisites must include six Quarters of biological work. Consent of the instructor is required. Mr. Taft.

A conference, laboratory, and library study of the classification and morphology of the freshwater algae. Importance of the algae in fish culture, water supplies and soils is discussed.

701. Special Problems: Taxonomy, Morphology, Physiology, Cytology, Plant Pathology, and Anatomy. Three to fifteen credit hours each Quarter. Autumn, Winter, Spring. Offered at Columbus and at Wooster. The staff.

720. Plant Microchemistry. Five credit hours. Autumn Quarter. One lecture and three two-hour laboratory periods each week. General prerequisites must include Botany 605 and 606. Desirable antecedents, general inorganic and organic chemistry. Mr. Sampson.

The identification of organic and inorganic substances in plant tissues by microchemical methods and polarized light. These methods are of special value in recognizing substances within cells and local regions too small to be separated for test-tube methods of tissue analysis.

Not open to students who have credit for Botany 617.

725. Physiological Methods. Three credit hours. Winter Quarter. Six laboratory hours each week. Botany 605-606 must be included in the general prerequisites or taken concurrently, except by special permission of the instructor. Mr. Meyer.

A laboratory course in the methods of plant physiology such as measurements of H-ion concentration, osmotic values, permeability, enzyme activity and the processes of transpiration, respiration, and photosynthesis. Conferences, readings and laboratory work.

Not open to students who have credit for Botany 633.

730. Physiological Methods. Three credit hours. Spring Quarter. Six laboratory hours each week. Botany 605-606 must be included in the general

* Not given in 1946-1947.

prerequisites or taken concurrently, except by special permission of the instructor. Mr. Meyer.

Methods of measuring the physical factors of the environment that influence plant growth and development, both under laboratory and field conditions. Methods of growing plants under controlled conditions for experimental work. Conferences, readings, and laboratory work.

Not open to students who have credit for Botany 632.

735. Plant Growth. Three credit hours. Spring Quarter. Three lectures each week. Consult instructor before registering. Mr. Sampson.

A study of the physiology of growth. Special attention is given to the interrelated effects of internal and external factors upon growth, movement and reproduction in plants. Bibliographies and reviews of literature.

Not open to students who have credit for Botany 634.

740. Plant Cytogenetics. Five credit hours. Autumn Quarter. Three lectures and two two-hour laboratory periods each week. General prerequisites must include thirty Quarter hours of biological work and consent of the instructor. Mr. Paddock.

A study of the cell in relation to genetic phenomena, hybridization, hybrid segregation, mutation and speciation. Factors affecting the behavior of chromosomes during mitosis and reduction division, effects on chromosome number and morphology, and on the inheritance and expression of known genes.

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Education, Course 683.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

810. Botanical Colloquium. One credit hour. Autumn, Winter, and Spring Quarters. Required of all graduate students majoring in botany. Offered at Columbus and at Wooster. All instructors.

812. Seminar in the History of Botany. One credit hour. Winter Quarter. Recommended for all graduate students majoring in botany. Mr. Waller.

950. Research in Botany. Autumn, Winter, and Spring Quarters. Offered at Columbus and at Wooster.

Research work in taxonomy, morphology, anatomy, cytology, physiology, genetics, plant pathology, or economic botany is offered by various members of the staff. Mr. Transeau, Mr. Stover, Mr. Sampson, Mr. Waller, Mr. Meyer, Mr. Blaydes, Miss Lampe, Mr. Taft, Mr. Wolfe.

BUREAU OF BUSINESS RESEARCH
Office, 206 Commerce Building

PROFESSOR BOOTHE, ASSISTANT PROFESSORS YOCUM, KELLOGG, AND ARNOLD

The purposes of the Bureau of Business Research are to facilitate the research activities of the faculty and the graduate students of the College of Commerce and Administration and at the same time to make cooperative studies in business and industry which will be valuable in the commercial and industrial development of the state. Through its research activities and its monthly business review, *The Bulletin of Business Research*, the Bureau maintains continuous contacts with representatives of trade and industry in the state, as well as with research and administrative departments of the Federal, State, and local governments.

For many years the Bureau of Business Research has served as the central coordinating agency for research in problems of business operation and of basic economic trends in the state. The Bureau sponsors each year a state and regional Conference of Statisticians on Business Research.

The Bureau maintains physical equipment such as adding and calculating machines, tabulating machines, typewriters, duplicating equipment, etc., as

well as a technical and clerical staff. These facilities, in so far as possible, are available to members of the instructional staffs of the various departments of the College of Commerce, to graduate students where researches of a quantitative nature can be undertaken only with the cooperation of a research organization, and for demonstration of machine procedures and techniques to undergraduate classes. There is also maintained a specialized research library in the field of business and industrial statistics. Researches which meet the standards of the Bureau are published as books, monographs, or special studies of the Bureau and given widespread circulation by the Bureau.

BUREAU OF EDUCATIONAL RESEARCH

Office, 200, 201 Arps Hall

PROFESSORS HOLY, CHARTERS (EMERITUS), DALE, ECKELBERRY, RATHS, TYLER, AND WOELFEL, ASSOCIATE PROFESSOR FLESHER, ASSISTANT PROFESSORS MacLATCHY, PATTERSON, AND WHITEHEAD, MISS SEEGER, MRS. EWAN, RESEARCH ASSOCIATES AND ASSISTANTS

The major purpose of the Bureau of Educational Research is to promote the scientific investigation of educational problems in the College, in the University, and in the public schools of the State. To facilitate its work, two steps were taken in the Autumn of 1942. The first of these was the action of the Board of Trustees on October 11, 1942, which authorizes the President of the University to assign staff members from other departments in the University to the Bureau for full-or part-time services to carry on approved investigations. The second of these was the setting up of an Advisory Committee consisting of the Vice President, the Dean of the Graduate School, the Dean of the College of Education, a representative from each of the departments in the College and from the Departments of Agricultural Education and Home Economics Education, and the major members of the Bureau staff.

Library. The research library contains large quantities of material in the form of manuscripts, pamphlets, bulletins, reports, modern textbooks for elementary and high-school grades, and educational periodicals. This library is in charge of a reference librarian, and her services together with the library material, are utilized in the preparation of bibliographies and reports on problems presented by those engaged in educational work.

Courses. In order to make the resources of the Bureau serve for research purposes, students desiring to work in the Bureau may register in certain courses listed in the departments of Education and Psychology. Courses must be approved by the chairman of the department and by the Director of the Bureau. Such students will be under the direction and supervision of the Bureau staff members.

Research Problems. Students taking such courses are given practical problems upon which to work. According to the nature and exacting character of the problem and the scholastic status of the student, he may be registered in either of two groups of courses, as follows:

MINOR PROBLEMS. Two to four credit hours. Investigation of minor problems.
Education 600
Psychology 650

INDIVIDUAL PROBLEMS. Two to ten credit hours. Investigation of problems leading to preparation of theses for advanced degrees.
Education 950
Psychology 950

NOTE: Descriptions of these courses, prerequisites, and the divisions into which the two Education courses are divided will be found under the department announcements.

BUREAU OF SPECIAL AND ADULT EDUCATION

Office, 321 Arps Hall

PROFESSORS NISONGER AND SANDERSON, ASSOCIATE PROFESSOR ROSEBROOK

The function of the Bureau of Special and Adult Education is to promote the education of all types of exceptional children (the handicapped and the gifted) and to further the work of adult education.

Qualified students in training may secure under adequate supervision practical field experience in special or adult education, or in psycho-educational work.

Students interested in the work of this Bureau should confer with the Director.

SPECIAL EDUCATION

Field Service. The objectives of field service are as follows: to assist the smaller communities in organizing the work of special education; to serve in an advisory capacity the communities in which special education has already been organized; and to cooperate with state and local organizations in formulating a state program for the protection, treatment and training of all types of exceptional children and for the removal of the causes that handicap children.

Supervised Experience for Graduate Students. Opportunities are available for supervised field experience for graduate students.

Teacher Training. Only persons who have had successful experience in teaching normal children should prepare to teach exceptional children. A student who wishes to prepare to teach mentally retarded children, behavior problem children, or children defective in speech should select courses from those recommended below.

Candidates for the degree of Bachelor of Science in Education interested in teaching exceptional children should register in the Curriculum in Elementary Education. In this curriculum students are required to elect 20 additional hours in some one selected field at the junior-senior level. Those interested in special education may meet this requirement by choosing electives from the courses listed below.

All types of exceptional children

Psychology 609. Exceptional Children: General Survey
Psychology 613. Mental and Educational Tests
Psychology 615. Psycho-Educational Diagnosis and Treatment
Psychology 616. Individual Testing by the Binet-Simon Method
Psychology 618. Clinical Tests
Psychology 619. Psychological Clinic
Psychology 661. Psycho-Educational Problems
Psychology 669. Gifted Children
Psychology 688. Psychology of Reading
Psychology 820. Advanced Psychological Clinics
Education 764. Supervised Teaching in Special Classes
Education 767. The Education of Exceptional Children
Education 800-1. Seminar in Special Education

Mentally retarded children

Psychology 611. Mentally Deficient Children
Psychology 622. Delinquent Children
Education 458. Wood and Metal Work
Education 765. Principles and Methods of Teaching the Mentally Retarded

Behavior problem children

Psychology 622. Delinquent Children
Psychology 634. Criminal and Legal Psychology
Psychology 641. Abnormal Psychology
Education 766. Principles and Methods of Teaching Behavior Problem Children
Sociology 625. Criminology
Psychology 671. Principles of Treating the Problem Child

Children defective in speech

Speech 656. Visual Hearing Techniques
Speech 692. Clinical Practice in Speech Correction
Speech 694. Speech Disorders Survey
Speech 816. Speech Pathology
Speech 504. Speech Functions and Responsibilities of the Teacher
Education 675. The Teaching of Speech

Research. Students interested in research problems connected with the work of the Bureau of Special and Adult Education may register in any of the following courses:

Psychology 650. Minor Problems
Psychology 950. Research in Psychology
Education 600-1. Minor Problems
Education 950-1. Research in Education
Speech 700. Minor Problems in Speech
Speech 950. Research in Speech

ADULT EDUCATION

Field Service. The aims of field service are as follows: to aid in the organization of adult study groups; to assist organized groups in formulating programs of study; to prepare and issue courses of study, bulletins and other materials for the use of adult groups; and to cooperate with state and local organizations in furthering the work of adult education.

University Courses. Students interested in taking work in adult education may enroll in any of the following courses:

Education 600-1. Minor Problems
Education 770. Adult Education
Education 950-1. Research in Education
Psychology 650. Minor Problems
Psychology 670. Psychological Problems of Adult Life
Psychology 679. Psychology of Public Attitudes
Psychology 950. Research in Psychology
Agricultural Extension 501. Extension Methods
Agricultural Extension 600. Extension Education

NOTE: Description of the courses listed above will be found under the department announcements, with the exception of those at the "800" and "900" level which are described in the Graduate School Bulletin only. See College of Agriculture Bulletin for Agricultural Extension 501 and 600.

BUSINESS ORGANIZATION

Office, 107 Commerce Building

PROFESSORS MAYNARD, WEIDLER, HOAGLAND, DICE, DUFFUS, BECKMAN, DAVIS, AND PIKE, ASSOCIATE PROFESSORS REEDER, CORDELL, DAMERON, NOLEN, DONALDSON, BURLEY, JUCIUS, AND LEY, ASSISTANT PROFESSORS RIDDLE, KIMBALL, AND MEYER

Prerequisites for Graduate Work: The Department of Business Organization offers majors leading to the degrees Master of Business Administration or Master of Arts. In each case, the program is based on the assumption that the candidate will have adequate undergraduate training in economics and business organization subjects. Specifically, each candidate must present undergraduate work as indicated below or pursue courses in this University of equivalent nature. Such courses will be taken in addition to the Graduate School requirements of forty-five hours of graduate work for the degree in question.

Minimum undergraduate requirements are:

(a) Business Law—six Quarter hours
Principles of Economics—ten Quarter hours
Principles of Accounting—ten Quarter hours
Economic Statistics—four Quarter hours
Money and Banking—five Quarter hours
Business Finance—five Quarter hours
Marketing—five Quarter hours
Industrial Management or Labor Economics—five Quarter hours

(b) One of the following four courses:
Public Utility Economics—five Quarter hours
Principles of Insurance—three Quarter hours
Transportation Economics—five Quarter hours
Economic Geography—five Quarter hours

For requirements for the degrees Master of Business Administration and Doctor of Philosophy, see pages 41 to 45 of this bulletin.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

614. Business Statistics. Four credit hours. One Quarter. Winter and Spring. Three class meetings and one two-hour laboratory period each week. General prerequisites must include courses in economic statistics. Mr. Smart.

Price and production indexes. Analysis of time series. Linear correlation applied to economic and business problems. The application of tabulating and other mechanical equipment to statistical problems will receive some attention.

615. Industrial Statistics. Three credit hours. Spring Quarter. General prerequisites must include courses in economic statistics. Mr. Smart.

The application of statistical methods to the design and analysis of experiments with a view to planning, organizing and controlling the output of industry.

621. Business Law: Contracts. Three credit hours. One Quarter. Autumn, Winter, Spring. Mr. Ley, Mr. Pike.

A course in the law of contracts for the student of business, including the study of the fundamentals of legally binding agreements between persons, and their enforcement.

Not available for graduate credit for students majoring in Business Organization or Accounting.

622. Business Law for Engineers and Architects. Three credit hours. One Quarter. Autumn, Winter, Spring. Mr. Ley.

A course in the law of contracts with special reference to engineering and architectural problems and with incidental reference to certain other phases of the law that most closely affect the engineer and architect.

623. Business Law: Agency, Sales, Property. Three credit hours. One Quarter. Autumn, Winter, Spring. General prerequisites must include Business Organization 621. Mr. Pike, Mr. Ley.

A study of selected, fundamental principles in the subjects named, deemed important to the student of business.

Not available for graduate credit for students majoring in Business Organization or Accounting.

625. Business Law: Negotiable Instruments. Three credit hours. One Quarter. Autumn, Winter, Spring. General prerequisites must include Business Organization 621. Mr. Donaldson.

A course in the laws governing bills of exchange, promissory notes and checks designed to guide the business man in his daily transactions with such instruments.

627. Business Law: Partnerships and Corporations. Three credit hours. One Quarter. Autumn, Winter, Spring. General prerequisites must include Business Organization 621. Mr. Pike.

A course designed to give the student of business a practical working knowledge of important laws governing the formation and operation of partnerships and corporations.

633. Governmental Agencies and Business. Three credit hours. Winter Quarter. Three meetings each week. Mr. Ley.

A study of the various administrative agencies created by the local, state, and federal governments for the regulation of business from the viewpoint of the student of business. Particular consideration is given to the organization, jurisdiction and procedure of such administrative agencies and their relations to business.

*635. **Business Policy.** Five credit hours. One Quarter. Autumn, Winter, Spring. Five class meetings each week. General prerequisites must include a course in intermediate accounting, a course in money and banking, a course in elementary economic statistics, Business Organization 650, 680, and 700, and in addition the approval of a college committee which supervises this course.

The approach of this course is that of the chief administrative officers of a business enterprise. The course deals with such topics as the functions of administration; the contributions of accounting, finance, production, management, marketing, statistics, etc., to the solution of managerial problems; the evaluation and control of business risks; the establishment and supervision of departmental plans; and the development of public relations.

640. **Corporate Organization and Control.** Three credit hours. One Quarter. Autumn, Winter, Spring. Three class meetings each week. Mr. Donaldson.

Types of business enterprise; the corporation; rights, duties, obligations, and liabilities of stockholders, directors, and officers.

642. **Real Estate Principles.** Three credit hours. One Quarter. Autumn and Spring. Three class meetings each week. Mr. Hoagland.

Principles of real property ownership and real estate practice; types of deeds, leases, restrictions; real estate brokerage, selling, advertising; property management; subdividing and developing; zoning and its effects.

643. **Real Estate Finance.** Three credit hours. Winter Quarter. Three class meetings each week. General prerequisites must include Business Organization 642. Mr. Hoagland.

Methods available for financing the ownership or occupancy of real property. Real estate and real estate paper as a field of investment. Problems involved in appraisal and practical methods of appraisal.

644. **Real Estate Problems.** One to three credit hours. One Quarter Autumn, Winter, Spring. Permission of instructor must be obtained. Mr. Hoagland.

Individual research in the field of real estate, designed for students primarily interested in real estate investments and in possibilities of the real estate business.

645. **Trade Associations.** Three credit hours. Winter Quarter. Three class meetings each week. Mr. Hoagland, Mr. Duffus.

The nature and function of trade associations, and their relation to business and to government.

650. **Corporation Finance.** Five credit hours. One Quarter. Autumn, Winter, Spring. Five class meetings each week. Mr. Duffus, Mr. Donaldson, Mr. Riddle, Mr. Kimball, Mr. Hoagland.

Financial structure and problems of modern business corporations.

Not open to students who have credit for or who are taking Economics 616.

652. **Problems in Business Finance.** Three credit hours. One Quarter. Autumn and Spring. Three class meetings each week. General prerequisites must include Business Organization 650. Mr. Hoagland, Mr. Kimball.

A study of specific cases which involve the financial policies and operations of industrial companies. Intended to improve the students ability to utilize the principles and methods of financial analysis acquired in introductory courses.

653. **Industrial Consolidations and Mergers.** Three credit hours. Autumn Quarter. Three class meetings each week. General prerequisites must include Business Organization 640 or 650. Mr. Hoagland.

Historical and analytical study of industrial consolidations and mergers.

655. **Principles of Investment.** Three credit hours. One Quarter. Autumn and Spring. Three class meetings each week. General prerequisites must

* Not given in 1946-1947.

include Economics 616 or Business Organization 650. Mr. Hoagland, Mr. Donaldson.

Functions of investment; economic basis of investment; basic elements of investment; investment programs; problems of personal finance; field of investment. All these topics are considered from the point of view of the investor.

Not open to students who have credit for Business Organization 658.

656. Railroad and Public Utility Finance. Three credit hours. Winter Quarter. Three class meetings each week. General prerequisites must include Business Organization 650. Mr. Duffus, Mr. Riddle.

Financial problems peculiar to public service industries. American railroads and utilities as fields for investment and speculation and their financial administration under state and federal regulation.

657. Investment Analysis. Three credit hours. Winter Quarter. Three meetings each week. General prerequisites must include Business Organization 650. Mr. Riddle.

Principles and procedure of investment analysis; principles and technique of selecting corporation and government bonds, real estate obligations, and common stocks; the interpretation of financial factors; investments and business conditions; practical applications.

659. Investment Banking. Three credit hours. Spring Quarter. Three class meetings each week. General prerequisites must include Business Organization 650. Mr. Riddle.

Principles of long-period banking credit; process of investment banking; functions and operations of investment banking institutions; trends and problems of investment banking.

660. The Stock Market. Three credit hours. One Quarter. Autumn and Spring. Three class meetings each week. General prerequisites must include Business Organization 650 and a course in money and banking. Mr. Dice, Mr. Donaldson.

The New York Stock Exchange; brokerage houses, methods of trading; business cycles and movements of stock prices; regulation of stock issue and manipulation.

662. The Money Market. Three credit hours. Spring Quarter. General prerequisites must include a course in money and banking. Mr. Dice.

New York as a money market; the acceptance and commercial paper; brokers' loans; business loans; interest and discount rates; control of the supply of money through the Federal Reserve System; present problems and trends.

665. Foreign Exchange. Three credit hours. Winter Quarter. Three class meetings each week. General prerequisites must include a course in money and banking. Mr. Dice.

A study of the theory and practices of foreign exchange from the standpoint of both bankers and foreign traders. The relationship of foreign exchange to international trade and financial problems is included.

666. Practice Work in Banking. One to three hours each Quarter with total credit not to exceed six credit hours. Autumn, Winter, Spring. Students are admitted on the suggestion of the instructor in charge of cooperation with the banks concerned. Mr. Dice.

Students do actual work in a bank. Each student will attend conferences in regard to his work and make reports based on the different bank operations.

670. Bank Organization and Management. One to three credit hours. Winter Quarter. General prerequisites must include a course in money and banking and Business Organization 650. Mr. Dice.

This course deals with the organization and practical operation of banks; their relations to the Federal Reserve System; government control; trends and required reforms.

***674. Savings and Trust Institutions.** Three credit hours. Winter Quarter. Three class meetings each week. Given in alternate years. General prerequisites must include a course in money and banking. Mr. Hoagland.

The practical operations and economic significance of the building and loan associations, savings banks, trust companies, and various other institutions are studied.

* Not given in 1946-1947.

680. Industrial Organization and Management. Five credit hours. One Quarter. Autumn, Winter, Spring. Five class meetings each week. Mr. Davis, Mr. Jucius.

An examination of the basic fundamentals of management underlying the solution of problems of organization and operation in all business enterprise, followed by their application to such specific fields of industrial management as production, materials, personnel, etc.

682. Supervisory Management. Three credit hours. Winter Quarter. General prerequisites must include Business Organization 680. Mr. Davis, Mr. Jucius.

The work of operative management within the modern factory, with particular reference to the responsibilities of the shop department head. A consideration of various phases of industrial management from his viewpoint. A critical examination of his problems, such as the intra-departmental control of production progress, maintenance of quality, training of employees, handling of grievances, correct disciplinary procedures, morale maintenance, and others, in the light of accepted management principles.

684. Industrial Management Field Work. Three to six credit hours. One Quarter. Autumn, Winter, Spring. General prerequisites must include Business Organization 680. Mr. Davis, Mr. Jucius.

The student is expected to obtain full-time employment with an approved industrial concern. He is required to investigate and report on certain management problems of the concern. The requirements of the course can not be met while in residence at the University. The course offers an opportunity to observe the application of management principles under actual operating conditions.

685. Purchasing, Stores, and Inventory Control. Three credit hours. One Quarter. Winter and Spring. Three class meetings each week. General prerequisites must include Business Organization 680. Mr. Davis, Mr. Jucius.

An examination of the objectives, principles, and methods that enter into the work of managing the functions of supply in industry. Considers various problems including those relating to the planning of materials requirements, purchasing, receiving, storing and disbursing.

686. Personnel Organization and Management. Three credit hours. One Quarter. Autumn and Spring. Three class meetings each week. General prerequisites must include Business Organization 680. Mr. Davis, Mr. Jucius.

An examination of the staff work required in planning, organizing, and controlling the personnel functions in the business organization, as well as the personnel responsibilities of the line executive. Presents basic principles and procedures relating to employment, industrial health and safety, labor relations and morale, employee education and training, and wage and salary administration.

Not open to students who have credit for Business Organization 689.

687. Production Organization and Management. Three credit hours. One Quarter. Autumn and Winter. Three class meetings each week. General prerequisites must include Business Organization 680. Mr. Davis, Mr. Jucius.

An examination of the general staff functions of production control and its relations with the line organization of the manufacturing division; the coordination of production with sales and finance; the coordination of various technical staff services with the requirements of the line function of production; routine planning, scheduling, and other control functions as they enter into interdepartmental coordination within the line organization.

688. Work Standards and Labor Compensation. Three credit hours. Spring Quarter. Three class meetings each week. General prerequisites must include Business Organization 680. Mr. Davis.

A critical examination of policy, functionalization, organization morale, business procedure, standardization, and other fundamental concepts in business organization and operation, as they enter into the practical determination of good working conditions, a fair day's work, and good wages.

689. Retail Personnel Organization and Management. Three credit hours. Spring Quarter. General prerequisites must include Business Organization 680 and 700. Mr. Maynard, Mr. Jucius.

This course examines the personnel management problems of executives in modern retail business. It considers management's responsibilities for an effective and proper use of its human resources, and the methods that it uses in analyzing its personnel problems, as well as

the techniques employed in selecting, training, transferring, promoting, and dismissing members of the organization, controlling wage and salary adjustments, handling grievances, and performing other personnel duties.

Not open to students who have credit for Business Organization 686.

691. Office Organization and Management. Three credit hours. Spring Quarter. Three class meetings each week. General prerequisites must include Business Organization 680. Mr. Davis, Mr. Jucius.

The planning, organizing, and controlling of office work. Problems of office standards, business forms and their design, the selection of business machines, the analysis of office methods.

Not open to students who have credit for Business Organization 686.

692. Problems in Personnel Organization and Management. Three credit hours. Spring Quarter. Three class meetings each week. General prerequisites must include Business Organization 686 or 689. Mr. Davis, Mr. Jucius.

This course is concerned with solving actual problems and examining case histories with a view to developing the student's proficiency in applying principles to and in handling technical tools in connection with such personnel problems as employment, industrial health and safety, labor relations and morals, employe education and training, wage and salary administration, and relations with governmental agencies.

700. Marketing. Five credit hours. One Quarter. Autumn, Winter, Spring. Five class meetings each week. Mr. Beckman, Mr. Cordell, Mr. Maynard, Mr. Nolen.

A general but critical survey of the field of marketing. Consumer demand in relation to the marketing machinery. Functions, methods, policies, marketing costs, and problems of the farmer, manufacturer, wholesaler, commission merchant, broker, retailer and other middlemen. Emphasis on principles, trends, and policies in relation to marketing efficiency.

703. Business Research. Three credit hours. Autumn Quarter. Two lectures and one two-hour laboratory period each week. General prerequisites must include Business Organization 650, 680, and 700, a course in elementary economic statistics, and permission of the instructor.

Business research treated from the viewpoint of the business executive. The course deals with the discovery and utilization of existing information realting to problems of analysis other than accounting. It also includes a study of the fundamentals of primary data research, sampling, and schedule construction. Machine techniques used in the tabulation and analysis of data will be available through the Bureau of Business Research.

Not open to students who have credit for Business Organization 702.

704. Problems in Marketing Research. Three credit hours. Winter Quarter. Two lectures and one two-hour laboratory period each week. General prerequisites must include Business Organization 702 or 703.

Problems in marketing research are studied as a basis for the development of market organizations, and the formulation of policies and plans. Field work, including schedule construction, sampling, field testing, editing, tabulation, and analysis as applied to a specific marketing problem. Students will use electrical tabulating equipment in the analysis of their field project data.

705. Retail Merchandising. Four credit hours. One Quarter. Autumn, Winter, Spring. Four class meetings each week. General prerequisites must include Business Organization 700 and elementary courses in accounting. Mr. Maynard, Mr. Dameron.

A consideration of the organization and management of retail establishments: store location; store organization; buying; receiving; stockkeeping; inventories; sales systems; store policies; services; expenses and profits; deliveries; personnel problems, etc.

706. Wholesaling. Four credit hours. One Quarter. Autumn and Spring. Four class meetings each week. General prerequisites must include Business Organization 700 and elementary courses in accounting. Mr. Beckman.

The field of wholesaling; types and classes of wholesale organizations; tendencies in wholesaling; wholesale centers. Organization and management of wholesale establishments including location, purchasing, receiving, stock control, advertising, selling, order filling, traffic management, credit granting, expenses, profits, etc.

709. Credits and Collections. Four credit hours. One Quarter. Autumn, Winter, Spring. Four class meetings each week. General prerequisites must

include Business Organization 700 and elementary courses in accounting. Mr. Beckman, Mr. Cordell.

Credit—nature, functions, instruments, classes, risk, organization and management. Sources of credit information. Collection methods and policies. Extensions, compositions, adjustments, receiverships, bankruptcy, credit insurance, credit limits, credit and collection control.

710. Advanced Credit Problems. Three credit hours. Spring Quarter. Three class meetings each week. General prerequisites must include Business Organization 709. Mr. Beckman.

A course designed for students interested in mercantile or retail credit and in credit management as a career. Readings, cases, and problems. Emphasis on credit analysis and on term reports covering individual research of subjects chosen from the standpoint of each student's special interests.

712. Sales Management. Four credit hours. One Quarter. Autumn, Winter, Spring. Four class meetings each week. General prerequisites must include Business Organization 700. Mr. Maynard, Mr. Nolen.

This course deals with the functions of the sales manager. Principal topics considered are: Sales organization; planning, quotas and territories; selecting, training, and compensating salesmen; stimulation and supervision; and the use of cost data as a guide to the formulation of sales policies.

713. Salesmanship. Two or three credit hours. One Quarter. Autumn and Spring. General prerequisites must include Business Organization Organization 700. Mr. Maynard, Mr. Nolen.

Effective selling technique. The psychological, economic, and marketing foundations of the sales activities which are the basis of the daily work of the salesman. The material considered is designed to be of value to students throughout the University as well as those majoring in marketing or commercial education.

Not available for graduate credit for students majoring in Business Organization.

715. The Consumer in Our Marketing System. Three credit hours. Spring Quarter. Three class meetings each week. Mr. Beckman.

The entire marketing system considered from the viewpoint of the consumer; the consumer movement; consumer attitudes toward marketing institutions, advertising, salesmanship, and standardization programs; marketing and credit practices, policies and institutions, including consumers' cooperatives, which affect the consumer; and government aid and protection to the consumer.

716. Principles of Advertising. Four credit hours. One Quarter. Autumn, Winter, Spring. Four class meetings each week. General prerequisites must include Business Organization 700 also elementary courses in psychology. Mr. Dameron, Mr. Cordell.

A general course in advertising which considers the use of advertising and sales promotion in the sale of goods and services. Advertising agencies. Advertising departments. Copy, layout, illustrations, typography, engraving. Advertising media. Radio advertising. Advertising research. National advertising campaigns. Economics of advertising.

717. Advertising Practice. Three credit hours. Winter Quarter. Two class meetings and one two-hour laboratory period each week. General prerequisites must include Business Organization 716. Mr. Dameron.

The technique of advertising with emphasis on copy and layout. Consumer and trade advertising in general markets. Advertising production. Advertising technique in relation to selling problems. Preparation of radio advertising programs and technique of commercial announcements.

Laboratory assignments based upon practical advertising problems.

718. Radio Advertising. Three credit hours. Winter Quarter. Three class meetings each week. Prerequisite, Business Organization 716. Mr. Dameron.

Radio advertising from the viewpoints of the advertiser and of stations and networks selling radio time. History. Organization. Radio advertising problems: choosing the station, time and methods of broadcasting, programs, writing commercials, merchandising the campaign, research. Radio advertising by retailers. Sales promotion by networks and stations. Regulation of radio advertising. Consumer viewpoints.

719. Retail Advertising and Sales Promotion. Four credit hours. Spring Quarter. Two class meetings and one two-hour laboratory period each week. General prerequisites must include Business Organization 717 or the permission of the instructor. Mr. Dameron.

Advertising department of a retail store. Importance of newspaper advertising to retailer. Use of radio advertising by retailer. Window displays. Inside the store promotions. Direct mail. Sales promotion. Advertising and sales promotion budgets. Advertising plans. Coordination of selling effort.

Laboratory problems based upon actual store promotions

720-721. Exporting and Importing. Three credit hours. Two Quarters. 720, Autumn; 721, Winter. Three class meetings each week. Preferably preceded by Business Organization 665 and 716, and a course in money and banking. Mr. Van Cleef.

Methods of conducting export and import business; foreign trade correspondence and advertising; market analysis; export commission houses and other sales agencies; handling shipments; credits and collections.

***740. Public Utility Organization and Administration.** Three credit hours. Spring Quarter. Three class meetings each week. General prerequisites must include Economics 618 or 648.

Public utilities as business enterprises; problems of organization, regulation, and business management in the gas, electric, water, transportation, telephone, telegraph, radio communication, and other utility industries.

751. Motor Carrier Organization and Administration. Three credit hours. Spring Quarter. Three class meetings each week. Given in alternate years. General prerequisites must include Economics 618 or 648 or Business Organization 680. Mr. Duffus.

Highway transportation of persons and property by motor vehicles as a business enterprise: organization and administration of the different types and classifications of motor carriers; current problems confronting their management in their relations with travelers, shippers, competing transportation agencies, and administrative law.

752. Traffic Management. Four credit hours. Winter Quarter. Four class meetings each week. General prerequisites must include one of the following: Economics 618, 648, Business Organization 680, or must be taken concurrently. Mr. Duffus.

Traffic management as a factor in business enterprise. Analysis of the business relationships between shippers and carriers with respect to rates and services in the transportation of goods by rail, highway, water, pipe line, and air. Organization of traffic management by shippers and carriers.

755. Air Transport Management. Three credit hours. Autumn Quarter. Three class meetings each week. General prerequisites must include Economics 619.

Major problems of business management in this industry. Financing the industry. Types of airports and problems of their operation. Choice of and routing of equipment. Functions and management of the operations department. Air mail, express and freight services. Rate making. Insurance practice. Personnel and other labor relationships—Public relations.

756. Air Traffic Sales Management. Three credit hours. Winter Quarter. Three class meetings each week. General prerequisites must include Business Organization 755.

The organization and operation of the traffic department of air transport organizations. The advertising, selling, and sales management functions of business as applied to the problems and operations peculiar to this industry.

***759 Air Law.** Three credit hours. Autumn Quarter. Three class meetings each week. General prerequisites must include Business Organization 755.

A study of state and federal regulation of air carriers. Consideration is given to safety measures, including registration and licensing of aircraft and pilots and establishment of air traffic rules. An examination of the regulations dealing with service, rates and financing, and of the various regulatory commissions, including the Civil Aeronautics Authority, Air Rights. The law of common carriers.

* Not given in 1946-1947.

760. Personal Insurance. Three credit hours. Winter Quarter. Three class meetings each week. Mr. Bowers.

Life insurance; accident and health insurance; annuities. Premiums; reserves; investments; surrender values; dividends, etc. Types of policies and companies. Adaptation of insurance to individual cases. Agency organization; state supervision.

761. Casualty Insurance and Surety Bonding. Three credit hours. Spring Quarter. Three class meetings each week. Mr. Ley.

A study, in part, of the following types of insurance and bond coverages: automobile collision; public liability and property damage, including automobile; burglary and robbery; sprinkler leakage and water damage; public officials, court, fiduciary, contract, and depository bonds; title insurance and credit insurance. An examination of the types of insurance and bonding companies and of the extent of governmental supervision and regulation thereof.

764. Fire and Marine Insurance. Three credit hours. Winter Quarter. Three class meetings each week. Mr. Ley.

Detailed examination of fire, ocean and inland marine insurance contracts. A study of consequential fire coverages including use and occupancy, rent, rental value, and leasehold insurance; inspection and rate making, and adjustment. Types of insurance companies and governmental supervision and regulation thereof.

799. Special Problems in Business Organization. One to three credit hours. One Quarted. Autumn, Winter, Spring. Permission of the instructor is required.

Individual investigations of specific problems in the following fields of Business Organization:

a. Corporation Organization and Finance. Mr. Hoagland and others.
b. Real Estate Problems. Mr. Hoagland and others.
c. Insurance. Mr. Bowers and others.
d. Marketing. Mr. Maynard and others.
e. Banking. Mr. Dice and others.
f. Industrial Management. Mr. Davis and others.
g. Transportation and Public Utilities. Mr. Duffus.
h. Radio Advertising. Mr. Dameron.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 45.

804. Corporation Finance for Graduate Students. Three credit hours. One Quarter. Winter and Spring. Mr. Hoagland, Mr. Donaldson.

A conference course for graduate students. The content for any particular Quarter will be adapted to the needs of the students enrolled for that Quarter and will be announced in advance.

815-816. Advanced Principles of Marketing. Three credit hours each Quarter. Autumn and Winter. General prerequisites must include Business Organization 700. Mr. Beckman.

A critical study of fundamental principles of marketing. Special emphasis on the historical and theoretical aspects of the subject.

817. Marketing Problems of Contemporary Importance. Three credit hours. Spring Quarter. General prerequisites must include Business Organization 700. This course may be repeated. Mr. Beckman, Mr. Maynard.

A consideration of selected marketing problems, the choice being dependent upon their contemporary significance and the special needs of the students enrolled in the course. As part of the work in this course, each student is assigned a subject for research, analysis, and presentation before the class. At least one written report must be submitted by the student.

818. Seminar in Marketing. Three credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include Business Organization 700. This course may be repeated.

Regular class meetings and group discussions of the subject matter embodied by one of the following areas in the field of marketing:

(a) Advertising. Mr. Dameron, Mr. Cordell.
(b) Credits and Collections. Mr. Beckman, Mr. Cordell.
(c) Marketing Research.

(d) Retailing. Mr. Maynard. Mr. Dameron.
(e) Sales Management. Mr. Nolen, Mr. Maynard.
(f) Wholesaling. Mr. Beckman.

819. History of Marketing and Early Marketing Literature. Three credit hours. Autumn Quarter. General prerequisites must include Business Organization 700 and permission of the instructor. Mr. Maynard.

Evolution of marketing institutions, policies, and thought. Critical study and evaluation of early literature in the field, with reference to the business conditions prevailing at the time.

820. Problems of Banking and of Stock Prices. One to three credit hours. Spring Quarter. Mr. Dice.

A seminar in the leading problems relating to banking and to stock prices. The desires of the group will determine whether the major part of the course shall be devoted to problems of banking or to problems involved in determining the movements of stock prices.

827. Stock Market for Graduate Students. Three credit hours. Autumn Quarter. Mr. Dice.

A study of the problems involved in judging stock values.

***829. Advanced Personal Insurance.** Three credit hours. Spring Quarter. Given in alternate years. Mr. Bowers.

A critical analysis of special problems in the field of life, accident, health and old age insurance. A study of personal insurance programing.

830. Advanced Property Insurance. Three credit hours. Spring Quarter. Given in alternate years. Mr. Ley.

A critical analysis of special problems in the field of fire and casualty insurance. A study of the newer types of fire and casualty insurance.

831. Graduate Seminar in Business Organization for Beginning Graduate Students. Two credit hours. Winter Quarter. Mr. Cordell.

833. The Theory of Organization and Operation. Three credit hours. Autumn Quarter. General prerequisites must include Business Organization 680. Mr. Davis, Mr. Jucius.

An examination of the following factors as they enter into the problems of planning, organizing and controlling business activities: Business objectives, business ideals, executive leadership, business plans and planning, business policy, functions and functionalization, physical factors of environment. The point of view is that of the administrative executive.

834. The Theory of Organization and Operation. Three credit hours. Winter Quarter. General prerequisites must include Business Organization 680. Mr. Davis, Mr. Jucius.

An examination of the following factors as they enter into the problem of planning, organizing and controlling business activities: Responsibility, authority, accountability, organization structure, line organization, staff organization, completely functionalized relationships, committee organization, organization specifications. The point of view is that of the administrative executive.

835. Advanced Industrial Management. Three credit hours. Winter Quarter. General prerequisites must include Business Organization 680. Mr. Davis, Mr. Jucius.

A critical survey and examination of the current trends and advanced problems in the organization and management of industrial enterprises.

845. Transportation and Public Utilities for Graduate Students. Three credit hours. One Quarter. Autumn and Winter. Mr. Duffus.

A conference course for graduate students. The content for any particular Quarter will be adapted to the needs of the students enrolled for that Quarter and will be announced in advance.

950. Research in Business Organization. Autumn, Winter, and Spring Quarters.

Individual investigations, group discussions participated in by those investigating related subjects. The following fields are suggested:

(a) Corporation Organization and Finance. Mr. Hoagland, Mr. Duffus, Mr. Riddle, Mr. Donaldson.

* Not given in 1946-1947.

(b) Real Estate Problems. Mr. Hoagland.

(c) Insurance. Mr. Bowers, Mr. Ley.

(d) Marketing. Mr. Maynard, Mr. Beckman, Mr. Cordell, Mr. Dameron, Mr. Nolen.

(e) Banking. Mr. Dice.

(f) Industrial Management. Mr. Davis, Mr. Jucius.

(g) Transportation and Public Utilities. Mr. Duffus.

CERAMIC ENGINEERING
Office, 131 Lord Hall

PROFESSORS CARRUTHERS, WATTS (EMERITUS), KING, BOLE (RESEARCH), BLAU, AND RUSSELL

The following courses do not carry credit for students who received the degree of Bachelor of Ceramic Engineering from The Ohio State University: 600, 601, 603, 605, 610, 615, 620, 705, 706, 707, 708. Courses 701, 702, and 703 may be taken in two different fields and only one of these fields is required for the Bachelor's degree. Graduate students may therefore receive credit for these courses in the fields which did not count towards the Bachelor's degree.

Prerequisites for Graduate Work: Students having a degree in ceramic engineering or technology from an accredited college or university and who have a point average of not less than 2.5 in their undergraduate work and 2.7 in their graduate work may be admitted to graduate study in the Department of Ceramic Engineering subject only to arrangement with adviser or faculty committee.

Students not having a degree as noted above should have a degree covering a major in one and minors in one or more of the physical sciences and should have point averages as indicated above.

Candidates for advanced degrees are required to have credit for courses in qualitative and quantitative analysis, physical chemistry, thermochemical mineralogy, mathematics through calculus including analytical mechanics, at least one year's work in physics with laboratory and one year's work in engineering drawing. The prerequisites for graduate work in ceramic engineering and technology are represented by departmental courses 401, 600, 601, 610, 615, and 620. With approval of adviser these requirements may be met by passing comprehensive examinations with the exception of Ceramic Engineering 620.

Applicants who wish to pursue graduate work in ceramic engineering and who have had special and successful experience may be given special consideration as to point average and other requirements.

Fields of Study: Fields of study may be classified broadly as ceramic engineering and ceramic technology, and research under this classification may be pursued in the following specific fields: abrasives, vitreous enamels, glass, structural clay products, refractories, terra cotta, whiteware (electrical porcelain, sanitary ware, and dinnerware), and technical design of ceramic equipment.

Requirements of the Ph.D. Degree: To obtain the degree of Doctor of Philosophy in ceramic engineering students are required to have credit for at least fifteen hours in approved 700 courses of the department in addition to requirements for the Master's degree and the regular requirements of the Graduate School.

Departmental Committee on Graduate Work: The three members of the department instructional staff will act as a committee, in cooperation with the Entrance Board and Graduate School, in passing on special cases.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

600. Theory of Drying. Three credit hours. Autumn Quarter. Three lectures each week. General prerequisites must include two Quarters of college physics. Mr. Carruthers.

A study of the fundamental physical laws and ceramic technology involved in drying ceramic wares and their application to commercial practice.

601. Driers, Kilns, and Theory of Firing. Five credit hours. Winter Quarter. Five lectures each week. General prerequisites must include Ceramic Engineering 600. Mr. Carruthers.

A study of the fundamental principles involved in firing ceramic wares, their application in various ceramic processes and the various types of driers and kilns used in ceramic plants.

603. Elements of Ceramic Plant Engineering. Five credit hours. Winter Quarter. Five lectures each week. General prerequisites must include Ceramic Engineering 600. Mr. Carruthers.

A study of the basic processes and equipment used in ceramic manufacturing, including grinding, sizing, filtration, draft, heat transfer, and extrusion.

605. Bodies, Glazes, and Colors. Four credit hours. Spring Quarter. Four lectures each week. General prerequisites must include Ceramic Engineering 615 and 620 and Mineralogy 605. Mr. Russell.

A study of raw materials, composition, and process used in the production of ceramic bodies, glazes, and colors.

610. Refractories and Their Uses. Five credit hours. Spring Quarter. Five lectures each week. Mr. King.

Lectures on refractories, their physical and chemical compositions and properties, their utilization and testing.

615. Ceramic Calculations. Five credit hours. Autumn Quarter. Five recitations each week. General prerequisites must include courses in ceramic analysis. Mr. King.

Solution of chemical and physical problems involved in compounding ceramic mixtures, including wet blending. Also instruction in development of series, containing one, two, and three variables.

620. Physical and Chemical Measurements of Clays and Other Ceramic Materials. Five credit hours. Winter Quarter. Two recitations and eight laboratory hours each week. General prerequisites must include Ceramic Engineering 615 and Chemistry 680. Mr. King.

Application of physical chemical laws to ceramic materials and compounds. Laboratory practice in determination of the essential physical and chemical properties of ceramic mixtures and compounds in the plastic, dry, vitrified, and fused states.

625. General Glass Technology. Five credit hours. Autumn Quarter. Three lectures and four laboratory hours each week. Mr. Blau.

An introduction to commercial glasses from the viewpoints of their physical and chemical fundamentals. Starting with simple soda-lime glasses, the roles of the constituents are illustrated experimentally and considered in relation to: (a) The formation of glasses; (b) The physical properties of glasses; (c) Modern theories of the structure of glasses.

626. General Glass Technology (Advanced). Five credit hours. Winter Quarter. Three lectures and four laboratory hours each week. Mr. Blau.

Continuation of Ceramic Engineering 625 with particular emphasis on the coordination of composition and physical treatment for obtaining desired properties. This will include the detailed discussion and study of special types of glasses.

701. Ceramic Investigations. Five credit hours. Autumn Quarter. Conference, library, and laboratory work. General prerequisites must include Ceramic Engineering 605, 615, and 620. Mr. King, Mr. Russell.

Detailed studies and definite problems having practical application in one or more of the following fields of ceramic technology: (a) stoneware; (b) terra cotta; (c) saggers; (d) metal enamels.

702. Ceramic Investigations. Five credit hours. Winter Quarter. Conference, library, and laboratory work. Mr. King, Mr. Russell.

Detailed studies and definite problems having application in either of the following fields of ceramic technology: (a) earthenware, china, and porcelains; (b) structural clay products.

703. Ceramic Investigations. Five credit hours. Spring Quarter. Conference, library, and laboratory work. Mr. King, Mr. Russell.

Detailed studies and definite problems in practical applications in either of the following fields of ceramic technology: (a) glazes and colors; (b) refractories.

705. Ceramic Designing. Five credit hours. Autumn Quarter. One lecture, one quiz, and eight laboratory hours each week. General prerequisites must include Ceramic Engineering 601 and Mechanics 602. Mr. Carruthers.

Designing of clay plant structures and equipment such as buildings, bins, and retaining walls. Practical problems in structural design and storage of clays.

706. Ceramic Designing. Five credit hours. Winter Quarter. One lecture, one quiz, and eight laboratory hours each week. General prerequisites must include Ceramic Engineering 705. Mr. Carruthers.

A continuation of Ceramic Engineering 705. Study of drying and fan problems and the design of driers.

707. Ceramic Designing. Five credit hours. Spring Quarter. One lecture, one quiz, and eight laboratory hours each week. General prerequisites must include Ceramic Engineering 706. Mr. Carruthers.

A continuation of Ceramic Engineering 706. Study of firing and factory equipment problems and design of kilns and complete clay plants.

708. Technology of Glass. Three credit hours. Autumn Quarter. Two lectures and three laboratory hours each week. General prerequisites must include Ceramic Engineering 615. Mr. Blau.

Practice in melting typical glass batches. Studying physical behavior during the melting process and in the molten state. Measurement of some of the physical properties of the glass produced experimentally and of commercial glasses.

725. Vitreous Enamels for Metals. Three credit hours. Winter Quarter. Three lectures and six hours of preparation each week. General prerequisites must include Ceramic Engineering 615 and 620 and Mineralogy 605. Mr. King.

A presentation of fundamentals of composition, properties, and of application of vitreous enamels to metals. Vitreous enamels as types of glasses and the nature of adherence-to-metal phenomena will be stressed.

726. Glass Mixing, Melting and Furnaces. Three credit hours. Winter Quarter. Three lectures each week. General prerequisites must include Ceramic Engineering 625. Mr. Blau.

The practical processes and equipment for producing commercial molten glasses, including the selection and handling of materials, charging, processes in the furnace, types of furnaces, furnace design and operation.

727. Glass Manufacturing Processes. Four credit hours. Spring Quarter. Four lectures each week. General prerequisites must include Ceramic Engineering 625 and 726. Mr. Blau.

The industrial processes employed in the manufacture of various types of glass products, with special emphasis on the relations of physical properties to processes and products. This includes the study of hand production methods, the development of various machine processes employed in the manufacture of containers, bulbs, tubes, flat glass, wire glass, etc., as well as the annealing heat treating and decoration of glass ware.

728. Physical Vitreology. Five credit hours. Autumn Quarter. Three lectures and four laboratory hours each week. General prerequisites must include Ceramic Engineering 626. Mr. Blau.

The theoretical coordination of the previous courses in glass technology through the review of the fundamental concepts and relations of the glassy state, including such viewpoints as random space net-works, bond energy relations, thermal history influences, X-ray diffraction studies, and phase equilibrium diagram relations to the glassy phase.

729. Glass Manufacturing Problems. Five credit hours. Spring Quarter. Three lectures and four laboratory hours each week. General prerequisites must include Ceramic Engineering 626 and 728. Mr. Blau.

The practical coordination of the preceding courses in glass technology through the study of glass plant problems, including the investigation and analysis of defects of commercial glassware, methods for minimizing defects and their relation to production control and product performance.

750. Special Problems. Two to seven credit hours. Autumn, Winter, and Spring Quarters. Conference, library, and laboratory work. General prerequisites must include fundamental ceramic engineering courses. Consent of department is required. This course may be repeated for different problems or continuation of original problem, with total credit not to exceed fifteen hours. All instructors.

This course is designed to permit any properly qualified student to avail himself of the library and laboratory facilities of the department for carrying on a special investigation or for adding to his knowledge and technique in some ceramic subject.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

810-811-812. Porcelain for Electrical and Other Special Purposes. Two credit hours. Autumn, Winter, and Spring Quarters. Mr. Russell.

815. Seminar in Ceramic Engineering. One to five credit hours. Autumn, Winter, and Spring Quarters. Mr. Bole, Mr. Carruthers, Mr. King, Mr. Russell.

The course consists of conference and reports on problems in ceramic technology and engineering. Topics are chosen to cover the development of the ceramic industry.

950. Research in Ceramic Engineering. Autumn, Winter, and Spring Quarters. Permission of the instructor must be obtained.

Research in ceramic technology and engineering, in analytical and physical chemistry of ceramic materials and mixtures, in mineralogy and geology of ceramic deposits, in physical and chemical testing of ceramic materials and products, under Mr. Bole, Mr. King, or Mr. Russell; in the engineering, designing and testing of ceramic apparatus processes and structures, under Mr. Carruthers; in ceramic whitewares, under Mr. Russell; in refractories and metal enamels under Mr. King. The student may spend a part or all of his time on research work.

CHEMICAL ENGINEERING
Offices, 179, 180 Chemistry Building

PROFESSORS WITHROW AND KOFFOLT, ASSOCIATE PROFESSOR HERNDON, ACTING ASSOCIATE PROFESSOR PENCE (WRIGHT FIELD), MR. KLASSEN

Prerequisites for Graduate Work: The student must have had undergraduate training in chemical engineering in an accredited school or, if from an unaccredited school, in chemical engineering or in chemistry or in engineering provided in the latter cases he has had mathematics through calculus (an additional course in differential equations is desirable), two years chemistry including quantitative analysis (organic and physical chemistry desirable), and one year college physics. Desirable also are an introduction to mineralogy and engineering drawing.

Areas of Specialization: Graduate work in the department is designed with the idea of preparing the student for work in the field of chemical engineering, in related fields of industrial chemistry and applied electrochemistry, each of these two latter fields having a quite different undergraduate and graduate approach requiring flexibility in background and foundation. The regular chemical engineering approach is more rigorous and can be arranged by electives and petitions to include the other fields and thus meet the highly diversified opportunities of industry without requiring curricula in preparation for chemical and related industry. It is expected that those with the strictly chemical bavkground will prepare for work in industrial chemistry, but the curriculum may be arranged to take some of the chemical engineering work. It is expected that all graduate students will have had or will take certain of the basic courses in the department.

Departmental Examinations: Not later than the middle of the Quarter before a student expects to become a candidate for the Master's degree or the Quarter before he expects to take the general examination for the Doctor's degree, he must pass a series of written examinations covering the fundamental work in chemistry, industrial chemistry, and chemical engineering.

The general comprehensive examination for the Master's degree is both oral and written, but the latter part may be waived by the Departmental Committee on Graduate Work if the final writeup of the thesis has met all written criticism in an adequate manner.

Departmental Committee on Graduate Work: A committee, including the Chairman of the Department, acts in an advisory capacity for graduate students and is in charge of the administration of the regulations of the Department.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

***690. Chemical Engineering Safety.** Three credit hours. Autumn Quarter. Three lecture-quiz periods each week and six hours of preparation. Mr. Herndon, Mr. Withrow.

Safety from the standpoint of chemical engineering and chemical industry. Design features for safety in equipment for chemical engineering operations such as distillation, drying, and evaporation and for chemical industrial processes, such as hydrogenation, nitration, sulfonation,

* Not given in 1946-1947.

and esterification are emphasized. Consideration is given to plant management, safety equipment, organization of safety, fire and explosion protection squads, first aid, occupational hazards, and their symptoms.

Effective Autumn Quarter 1947.

691. Elements of Chemical Engineering. Two credit hours. Autumn Quarter. Two lecture-recitation periods each week. Physical chemistry must be included in the general prerequisites or taken concurrently, except with special permission of the instructor. Mr. Koffolt.

A thorough discussion of the engineering operations utilized in the chemical branch of engineering with emphasis on the engineering requirements of the market and economics and of the process and their effect on the engineering used. The work of the course is confined to the fundamental chemical engineering operations as fluid flow, heat transfer, and those operations largely utilized where solids are concerned such as crushing, screening, etc., and is directed toward a study of the fundamental principles involved, the engineering equipment available and by means of numerous computational problems, the application of science and mathematics.

692. Elements of Chemical Engineering. Two credit hours. Winter Quarter. Two lecture-recitation periods each week. Physical chemistry must be included in the general prerequisites or taken concurrently, except with special permission of the instructor. Mr. Koffolt.

A continuation of the study of engineering operations constituting the body of Chemical Engineering concerned with those operations largely utilized where liquids and gases are concerned, such as evaporation, distillation, drying, liquefaction, absorption, etc. Examples of special design requirements for processes such as carbonization, nitration, sulfonation, etc., as well as catalytic processes are studied with respect to the principles involved and the engineering equipment developed to carry out these processes. Emphasis is placed upon the concept of separations, such as the engineering requirement of the separation of solids from solids, from liquids, from gases, liquids from solids, from liquids, etc.

693. Problem in Chemical Engineering Operations. Two to eight credit hours. One Quarter. Autumn, Winter, Spring. Conference, library, and laboratory work. Chemical Engineering 691 and 692 must be included in the general prerequisites or taken concurrently. This course may be repeated on other problems as desired. Mr. Koffolt, Mr. Klassen, Mr. Withrow.

This course consists of individual or group conferences, library, and laboratory work dealing with the fundamental chemical engineering operations. The work of the course stresses quantitative treatment of the application of physics, mathematics, and chemistry in the field of Chemical Engineering.

Not open to students who have credit for Chemical Engineering 694.

694. Chemical Engineering Operations Laboratory. Eight credit hours. General prerequisites must include Chemical Engineering 691 and 692. Mr. Koffolt, Mr. Withrow, Mr. Klassen.

The fundamental laboratory course in chemical engineering concurrent with a series of lecture conferences and problems on the theory of chemical engineering operations. Laboratory study and investigation of the operating characteristics and efficiency of equipment utilized in carrying out the more important chemical engineering operations, such as fluid flow, heat transfer, distillation, etc. Stress is laid upon the practical utilization of calculus, physics, physical chemistry, and thermodynamics, and the construction and use of graphical charts and representations, such as nomographs, graphical calculus, etc.

†695-696-697. Chemical Engineering Operations. Three credit hours. Autumn and Winter Quarters. One three-hour lecture, recitation and computational period each week. General prerequisites must include differential and integral calculus and one year of college physics. Mr. Koffolt, Mr. Pence.

Fundamental courses in Chemical Engineering Operations covering computational problems and chemical engineering equipment. Work will cover such chemical engineering operations as flow of fluids, heat transfer, evaporation, crushing and grinding, mechanical separation, filtration, drying, absorption, extraction, distillation, and adsorption. The three Quarters work will in general be independent and may be taken in any order.

701-702. Industrial Chemistry. Three credit hours. Autumn and Winter Quarters. Three lectures each week. Physical chemistry must be included in

† Not given during the academic year, 1946-1947.

the general prerequisites or taken concurrently, except with special permission of the instructor. Mr. Withrow, Mr. Pence, Mr. Klassen.

The fundamental lecture course in the problems of industrial chemistry or chemical technology, dealing with the problems of the chemical industries, and stressing comprehensive and detailed computational treatment involving the applications of the fundamentals of economics, mathematics, physics, chemistry, chemical engineering, etc., to the solution of problems involving integration in part or in detail of sequences of chemical and engineering operations which make up processes. The work of the Autumn Quarter deals especially with the inorganic industries, while that of the Winter Quarter is related to the organic industries.

703. **Inspection Trip to the East.** No credit hours. One week between the Winter and Spring Quarters, 1947, and odd-numbered years thereafter. In addition to the general prerequisites, permission of the instructor is required. Mr. Withrow, Mr. Koffolt.

The trip includes Rittman, Akron, and Cleveland, Ohio; Niagara Falls, Rochester, and New York, New York; Grasselli and Deep Water Point, New Jersey, Wilmington, Baltimore, and Curtis Bay, Maryland; and Washington, D. C. The entire expense need not exceed $70.00. A satisfactory written report upon the work of the trip is required.

*704. **Inspection Trip to the West.** No credit hours. One week between the Winter and Spring Quarters, 1948, and even-numbered years thereafter. In addition to the general prerequisites, permission of the instructor is required. Mr. Withrow, Mr. Koffolt.

The trip includes Dayton, West Carrollton, Hamilton, Cincinnati, and Ivorydale, Ohio; Kensington, Illinois; Grasselli and Whiting, Indiana; Chicago and Argo, Illinois; Detroit, Wyandotte, and Midland, Michigan. The entire expense need not exceed $55.00. A satisfactory written report upon the work of the trip is required.

705. **Written Reports.** No credit hours. One week between the Winter and Spring Quarters in the University Library. General prerequisites must include Chemical Engineering 701-702. Mr. Herndon, Mr. Pence.

A substitute course for Chemical Engineering 703 or 704, allowed only upon presentation of reasons satisfactory to the instructor in charge. The course consists of assigned reading designed to familiarize the student with all that can be found in the literature or plants regarding chemical engineering, and specified industrial chemical processes, together with a full written report.

706. **Chemical Engineering and Industrial Chemistry Laboratory.** Two to five credit hours. Autumn Quarter. One hour conference and five to fourteen laboratory hours each week. General prerequisites must include an acceptable course in analytical chemistry. Chemical Engineering 701 must also be included in these general prerequisites or taken concurrently. Mr. Withrow, Mr. Herndon, Mr. Koffolt, Mr. Klassen.

An introduction to industrial chemical research through assigned manufacturing problems, beginning with the preliminary analysis of an inorganic, and organic production problem, progressing through the logical steps of laboratory development to the final culmination of the investigation—the design and layout of equipment of the plant to make the given chemical product. Emphasis is placed on the correlation and integration of the fundamental courses in chemistry, mathematics, chemical engineering operations, engineering drawing, etc. The specific problems are so chosen as to disclose the fundamental principles underlying the assigned industry. Weekly inspection trips are taken to plants in and around Columbus for study and report upon equipment and operation. Great emphasis is laid upon methods of attacking problems and upon organization of written and oral reports. Certain types of problems with engineering equipment and in factory research are required of all students, after which opportunity is given the student to select special problems in various portions of the fields of chemical engineering such as absorption systems, filtration, etc., and in industrial chemistry such as petroleum, sugar technology, intermediates, wood distillation, insecticides, starch, lime, chlorine, and plant fume questions.

707. **Engineering Chemistry and Chemical Engineering Laboratory.** Three credit hours. Winter Quarter. One conference and eight laboratory hours each week. General prerequisites must include Chemical Engineering 706. Chemical Engineering 702 must be taken concurrently. Mr. Herndon, Mr. Withrow, Mr. Klassen.

A continuation of Chemical Engineering 706. Special emphasis is laid upon technical methods of control as applied to industrial chemical processes and upon control of technical products

* Not given in 1946-1947.

according to standard American Society for Testing Materials methods and with standard equipment pointing out how test underlies engineering design.

708. Practical Experience in Chemical Engineering Work. Six credit hours. General prerequisites must include Chemical Engineering 691-692. Mr. Withrow.

Academic credit for this course is based on the reports of a student who has had practical experience of a chemical engineering character in a semi-responsible position covering a more advanced grade of work than that required in Chemical Engineering 501.

The student shall present a satisfactory report, the outline and basis of which, it is preferred, shall be arranged in conference prior to beginning the work. In general the report shall cover in very considerable detail, the particular industry with which the student is connected, in respect to market demand and economics, chemistry involved, engineering operations, plant layout, special equipment and design, operation methods, costs and efficiencies (in so far as this information is obtainable), labor problems, and safety and health hazards, together with other pertinent matter. Flow sheets, production schedules, sketches and photographs to illustrate the report, are especially to be desired.

The student also who has had twelve months' or more experience in industry may present a report which, if satisfactory, will be accepted in lieu of the above requirements.

712-713-714. Advanced Chemical Engineering Machinery Laboratory. Two to six credit hours. Autumn, Winter, and Spring Quarters. One conference and five to seventeen laboratory hours each week. General prerequisites must include Chemical Engineering 706-707 or special permission of the chairman of the department must be obtained. Mr. Koffolt, Mr. Withrow, Mr. Klassen.

An advanced course of minor problems dealing with various chemical engineering equipment with the view of acquainting students with all types of equipment, their design, and operation. The application of thermodynamics and graphics to chemical engineering problems.

The conferences cover topics chosen from the field of chemical engineering. Specific topics are given each Quarter.

Students may repeat these courses with credit, with the approval of the chairman of the department, inasmuch as the topics vary from year to year. The following is a list of topics from which work in this course is chosen: Graphical Chemical Engineering Computations, Drying, Humidification, Dehumidification, Adsorption, Absorption, Fume and Smoke, Crystallization, Filtration, Crushing and Grinding, Furnace and Pyrometry, Evaporation, Refrigeration, Distillation, Cracking, Heat Transfer, and Flow of Fluids.

***716-717-718. Chemical Engineering Operations.** Two credit hours. Autumn, Winter, and Spring Quarters. One lecture, one two-hour computational laboratory, and three hours of preparation each week. General prerequisites must include Chemical Engineering 691 and 692, except with special permission of the instructor. Mr. Koffolt, Mr. Withrow.

A continuation of the study of engineering operations constituting the body of Chemical Engineering concerned with those operations largely utilized where liquids and gases are concerned, such as evaporation, distillation, drying, absorption, etc. Emphasis is placed upon the concept of separation, such as the engineering requirements of the separation of solids from solids, from liquids from gases; liquids from solids, from liquids, etc. Emphasis is laid on computational problem work.

723. Special Project Problem Investigations. Five or six credit hours. One Quarter. Autumn, Winter, Spring. Conferences and laboratory work. General prerequisites must include Chemical Engineering 722, except by special permission. Mr. Withrow, Mr. Koffolt, Mr. Herndon.

Individual laboratory work on some problem chosen to develop power of independent investigation, with the understanding that preliminary separate reports on both analysis and planning of experimental work undertaken will be required before experimental attack on the problems themselves, involving special attention to hazards and safety measures.

Elective for students in the Graduate School.

***750-*751-*752. Chemical Engineering Thermodynamics.** Two credit hours. Autumn, Winter, and Spring Quarters. One lecture, one two-hour computational laboratory, and three hours of preparation each week. Mr. Koffolt, Mr. Herndon.

Application of the fundamental concepts and laws of thermodynamics to problems of chemical industry. The work of the course includes: first, second, and third laws of thermo-

* Not given in 1946-1947.

dynamics, dynamic functions, equations of equilibrium, pressure-volume-temperature relations of fluids, thermodynamic properties and diagrams, heat effects of physical and chemical processes, chemical equilibria, and estimating thermodynamic properties of industrial substances. Emphasis is laid on computational problem work with particular reference to its application in industrial practice.

Effective Autumn Quarter, 1948.

***760. Chemical Engineering Economy.** Two credit hours. Autumn Quarter. One lecture, one two-hour computational laboratory, and three hours of preparation each week. General prerequisites must include Chemical Engineering 718, 740, and 752, concurrent with Chemical Engineering 770, except with special permission of the instructor. Mr. Herndon, Mr. Withrow.

The background, organization, management and economic problems found in chemical engineering industries. The work of the course emphasizes computational work dealing with the following factors in Chemical Engineering reports: major products, by-products, choice of process, plant location, selection of chemical engineering equipment, transportation, labor, research, pilot plant developments, patents, and cost accounting for chemical industries.

Effective Autumn Quarter, 1949.

763. Applied Electrochemistry. Three credit hours. Spring Quarter. Three lectures each week. General prerequisites must include Chemistry 681-682-683 or special permission of the instructor must be obtained. Mr. Herndon.

A survey of the electrochemical industries and a discussion of the principles underlying the application of the electric current in chemical industries. Quantitative relationships and application of thermodynamics are stressed, requiring the solution of numerous problems.

Not open to students who have credit for Chemical Engineering 710.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

801. Special Problems in Chemical Engineering and Chemical Technology. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. Conference, library and laboratory work. General prerequisites must include satisfactory courses in the field of the problem undertaken. The course may be repeated on other problems as desired. Mr. Withrow, Mr. Koffolt, Mr. Herndon.

The work of the course is carried on by individual conference, library, and laboratory work and consists of problems involving application of physics, mathematics, drawing, mechanics, chemistry, economics, and general thermodynamics in the field of chemical engineering and chemical technology. This course is largely practical examinations by assigned special problems covering widely all the applications of fundamental underlying chemical engineering and chemical technology.

***861-*862. Advanced Chemical Technology.** Three credit hours. Winter and Spring Quarters. Three lectures each week and individual conferences. General prerequisites must include Chemical Engineering 718, 752, 760, and 880. Mr. Withrow.

An advanced lecture, problem, and conference course in chemical technology or industrial chemistry designed especially for students seeking an advanced degree. The course involves analysis of a series of the more important chemical industries as illustration of solution of industrial problems. Also individual problems are assigned which require a careful review of the literature, followed by the application of chemical and engineering principles to develop a workable solution. Such problems are designed to meet the needs and interests of the individual. The selection of problems is such that the solution will involve application of physics, mathematics, drawing, mechanics, chemistry, economics, and general thermodynamics. The work of the Winter Quarter deals with inorganic industries while that of the Spring Quarter is related to organic chemical industries.

Effective Winter Quarter, 1950.

***870. Advanced Applied Chemical Engineering and Industrial Chemistry Laboratory.** Five credit hours. Autumn Quarter. One hour conference and fourteen laboratory hours each week. Chemical Engineering 760 and 881 must

* Not given in 1946-1947.

be included in the general prerequisites or be taken concurrently. Mr. Withrow, Mr. Herndon, and Mr. Klassen.

A detailed presentation of industrial chemical research through assigned manufacturing problems, carrying the investigations through the logical steps of laboratory and small plant scale operation to design of plant for manufacture. Individual and group conferences and assignments.

Not open to students who have credit for Chemical Engineering 770.

Effective Autumn Quarter, 1949.

900-901-902. Advanced Industrial Chemistry and Chemical Engineering. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. One hour conference and five to fourteen laboratory hours each week. General prerequisites must include acceptable courses in industrial chemistry, or the permission of the instructor must be obtained. Mr. Withrow, Mr. Koffolt, Mr. Herndon.

An advanced course dealing with the solution of minor problems in industrial chemistry and chemical engineering. Special work will be planned along lines in industrial chemistry or chemical engineering as may be desired by the individual student.

905-906-907. Seminar in Industrial Chemistry and Chemical Engineering. Two credit hours. Autumn, Winter, and Spring Quarters. Two conference hours each week. General prerequisites must include satisfactory courses in industrial chemistry. Mr. Withrow, Mr. Koffolt, Mr. Herndon.

The course consists of conferences and reports upon methods of attacking special problems in industrial chemistry and chemical engineering. The topics vary from Quarter to Quarter, keeping in touch with the constant development of chemical industry.

950. Research in Industrial Chemistry and Chemical Engineering. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. Library, conference, and laboratory work. General prerequisites must include satisfactory courses in the chosen field of research. Mr. Withrow, Mr. Koffolt, Mr. Herndon.

Advanced research problems and dissertation in any one of the following fields depending upon undergraduate approach:

a. Chemical Engineering
b. Industrial Chemistry
c. Applied Electrochemistry

CHEMISTRY

Office, 116 Chemistry Building
General Chemistry Office, 115 Chemistry Building

PROFESSORS MACK, EVANS (EMERITUS), McPHERSON (EMERITUS), HENDERSON (EMERITUS), FOULK (EMERITUS), BOORD, FRANCE, JOHNSTON, MOYER, BRODE, WOLFROM, HENNE, HASKINS, GARRETT, NEWMAN, AND HARRIS, ASSOCIATE PROFESSORS MacNEVIN, VERHOEK, LASSETTRE, AND WIRTH, NON-RESIDENT ASSOCIATE PROFESSOR ROTHEMUND (KETTERING FOUNDATION, ANTIOCH COLLEGE), ASSISTANT PROFESSORS HOLLINGSWORTH AND MacWOOD

Prerequisite for Graduate Work: The student must have had approximately 50 Quarter hours (33 semester hours) of undergraduate work in chemistry. This requirement must include general inorganic chemistry, qualitative and quantitative analysis, introductory courses in organic and physical chemistry, including laboratory work in all subjects.

Requirements for the Master's Degree: (a) The course requirements for the Master's degree are not rigidly fixed, but the program of work should lead to an adequate and well-rounded foundation for advanced work. These courses should be supplemented by others selected from the candidate's field of specialization and in conference with his adviser. (b) The candidate must give evidence of his ability to read chemical papers in either French or German. (c) About two weeks prior to the date proposed for conferring the degree the candidate must pass a written examination. Should the graduate record of the candidate be wholly satisfactory, the scope of the examination would be confined to the candidate's field of specialization.

Requirements for the Degree of Doctor of Philosophy: (a) The Department of Chemistry requires certain broad general courses of the graduate student during his first year. These courses include a systematic training in experimentation, a study of the thermodynamic approach to chemical problems, and advanced courses in organic, analytical and inorganic chemistry. A satisfactory performance in these general courses is required of the student who expects

to undertake a research and to become a candidate for the Doctor's Degree. (b) The student should acquire such broad mastery of his chosen field in Chemistry as may be reasonably expected of a professional chemist, and such background as may be acquired from the advanced courses and seminars offered by the Department and from laboratory experience and from the chemical literature (especially current literature). For admission to candidacy the student must pass satisfactorily an examination at a time that corresponds as nearly as possible to the beginning of his third year of graduate study. The examination will be written and oral, and will be largely limited to the student's field of specialization in Chemistry. (c) Further, the student must possess a good reading knowledge (in chemical literature) of both French and German, as determined by special examinations. (d) An acceptable dissertation and a final oral examination on the dissertation and related aspects of Chemistry are required.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

*625. **Water Analysis.** Five credit hours. Winter Quarter. Three lectures and six laboratory hours each week. Mr. Wirth.

Methods of sanitary and industrial water analysis, and interpretation of the analytical results.

647-648. **Organic Chemistry.** Three credit hours each. 647, Autumn and Winter; 648, Winter and Spring. Three lectures or recitations each week. General prerequisites must include acceptable courses in general and analytical chemistry. Mr. Boord, Mr. Brode, Mr. Wolfrom, Mr. Henne, Mr. Newman.

A fundamental course in organic chemistry. Chemistry 647 is devoted to a discussion of the aliphatic hydrocarbons and their derivatives and Chemistry 648 to a discussion of the coal tar compounds.

Not open to students who have credit for Chemistry 451-452. Not available for graduate credit for students majoring in chemistry.

649. **Organic Chemistry: Laboratory.** Three credit hours. One Quarter. Autumn and Winter. Nine laboratory hours each week. Chemistry 647 must be included in the general prerequisites or taken concurrently. Mr. Brode, Mr. Boord, Mr. Wolfrom, Mr. Henne, Mr. Newman.

The laboratory work naturally belonging to Chemistry 675. The preparation of a series of typical organic compounds, their purification, and a study of their properties.

Not open to students who have credit for Chemistry 451-452. Not available for graduate credit for students majoring in chemistry.

650. **Organic Chemistry: Laboratory.** Two or three credit hours. One Quarter. Winter and Spring. Nine laboratory hours each week. General prerequisites must include Chemistry 659; Chemistry 648 must be included in the general prerequisites or taken concurrently. Mr. Brode, Mr. Boord, Mr. Wolfrom, Mr. Henne, Mr. Newman.

A continuation of Chemistry 649.

Not available for graduate credit for students majoring in chemistry.

680. **Physical Chemistry.** Five credit hours. Autumn Quarter. Five lectures and recitations each week. General prerequisites must include Mathematics 442, Physics 433, and Chemistry 422. Mr. France.

Properties of gases, liquids, and solutions; chemical bonds; chemical equilibria; phase rule; electrolytes, colloids, and electrical phenomena; thermodynamics.

681. **Physical Chemistry.** Three credit hours. Autumn Quarter. Three lectures each week. Acceptable courses in physics and two Quarters of calculus must be included in the general prerequisites or taken concurrently. It is recommended that Chemistry 691 be taken concurrently. Mr. France, Mr. Johnston, Mr. Harris, Mr. Mack.

The fundamental course in physical chemistry.

Not available for graduate credit for students majoring in chemistry.

* Not given in 1946-1947.

682. Physical Chemistry. Three credit hours. Winter Quarter. Three lectures each week. General prerequisites must include Chemistry 681. It is recommended that Chemistry 693 be taken concurrently. Mr. France, Mr. Johnston, Mr. Harris, Mr. Mack.

A continuation of Chemistry 681.

Not available for graduate credit for students majoring in chemistry.

683. Physical Chemistry. Three credit hours. One Quarter. Autumn and Spring. Three lectures each week. General prerequisites must include Chemistry 682. It is recommended that Chemistry 693 be taken concurrently. Mr. France, Mr. Johnston, Mr. Harris, Mr. Mack, Mr. Wirth.

A continuation of Chemistry 682.

Not available for graduate credit for students majoring in chemistry.

*690. Physical Chemistry Laboratory. Three credit hours. Nine laboratory hours each week. An acceptable lecture course in physical chemistry must be included in the general prerequisites or be taken concurrently. Mr. Wirth.

This course is a duplication of parts of Chemistry 691, 692, and 693, and is offered especially for the engineers for the new five-year program in Chemical Engineering.

691-692-693. Physical Chemistry: Laboratory. Two credit hours. Autumn, Winter, and Spring Quarters. Six laboratory hours each week. An acceptable course in physical chemistry must be included in the general prerequisites or taken concurrently. These courses are designed to accompany Chemistry 681, 682, and 683, respectively. Mr. France, Mr. MacWood, and assistants.

Quantitative measurements of phenomena of chemical interest and the application of chemical principles to their interpretation. The measurements include experiments in the determination of molecular weights and chemical constitution, thermochemistry, reaction rates, equilibria, electrochemistry, colloid chemistry, high vacuum, and glass blowing techniques, etc.

701. Minor Problems in Chemistry. One to fifteen credit hours. Any Quarter. Conference, library, and laboratory work. General prerequisites must include satisfactory courses in the field of the problem undertaken. A student may repeat this course and may spend all or any part of his time on it during a Quarter. Department Staff.

This course is designed to permit any properly qualified person to avail himself of the library and laboratory facilities of the department for carrying out a minor investigation or for adding to his knowledge and technique in some chemical subject. A student may exercise entire freedom in his choice of instructor to conduct his work in this course.

721. Advanced Quantitative Analysis. Three credit hours. Spring Quarter. One lecture and six laboratory hours each week. General prerequisites must include previous or concurrent registration in Chemistry 622. Mr. Moyer.

The application of physical measurements to chemical analysis. The laboratory work includes potentiometric and conductometric titrations, photoelectric colorimetry, fluorometry, polarographic analysis and chromatography.

Not open to students who have credit for Chemistry 621.

722. General Quantitative Analysis. Three credit hours. Autumn Quarter. Three lectures or recitations each week. Mr. Moyer, Mr. MacNevin, Mr. Wirth.

General principles of chemical analysis.

Not open to students who have credit for Chemistry 622.

726. Inorganic Micro and Semicimro Analysis. Four credit hours. Winter Quarter. One lecture and nine laboratory hours each week. General prerequisites must include acceptable courses in quantitative analysis and inorganic or physical chemistry. Registration only by permission of the instructor. Mr. MacNevin.

Applications of micro, semimicro and microscopic methods to common problems.

Not open to students who have credit for Chemistry 626.

* Not given in 1946-1947.

728. Spectroscopic Analysis. Three to five hours. Spring Quarter. One lecture and two to four laboratory hours each week. Registration for more than three credit hours requires the permission of the instructor. Mr. Brode.

General principles of spectroscopic qualitative identification and quantitative estimation of the elements. Spectrophotometry of organic and inorganic compounds. Special applications to metallurgy, plant and biochemical analysis, identification of dyes and organic compounds.

Not open to students who have credit for Chemistry 628.

741. Qualitative Organic Analysis. Four credit hours. Spring Quarter. One lecture and nine laboratory hours each week. General prerequisites must include twelve credit hours of organic chemistry including laboratory work. Mr. Wolfrom.

A study of the systematic methods of separation, purification, and identification of organic compounds.

Not open to students who have credit for Chemistry 641 or 660.

742. Organic Micro and Semimicro Quantitative Analysis. Four credit hours. Autumn Quarter. One lecture and nine laboratory hours each week. General prerequisites must include acceptable courses in quantitative analysis and organic chemistry. Registration only by permission of the instructor. Mr. MacNevin.

Primarily a course in quantitative organic analysis using micro and semimicro methods. The common determinations of organic quantitative analysis are studied.

Not open to students who have credit for Chemistry 642.

***754. X-rays and Crystal Structure.** Four credit hours. Four lectures and recitations each week. General prerequisites must include calculus and one year of college physics. Given in alternate years. Mr. Harris, Mr. Blake, Mr. McCaughey.

This course is designed for those students of physics, chemistry, and mineralogy who intend to do research work in crystal structures and X-ray analysis.

This course is the same as Mineralogy 754 and Physics 754.

Not open to students who have credit for Chemistry 654, Mineralogy 654 or Physics 654.

761. Inorganic Chemistry. Three credit hours. Autumn Quarter. Three lectures or recitations each week. General prerequisites must include Chemistry 681-682-683 or its equivalent. Mr. Lassettre.

An elementary discussion of the modern theory of the chemical bond is given and accompanied by a discussion of experimental results on the structures of inorganic compounds. The following topics are treated: resonance energies, interatomic distances, prediction of bond angles, ionic character of covalent bonds, prediction of structures of simple inorganic compounds, structures of complex ions, structures of crystals, principles governing the structures of ionic and covalent crystals, crystal structures of minerals, relation between equilibrium constants and molecular structures.

Not open to students who have credit for Chemistry 661.

768. Non-aqueous Solvents. Three credit hours. Spring Quarter. Three lectures each week. Chemistry 683 must be included in the general prerequisites or taken concurrently. Given in alternate years. Mr. Verhoek.

A consideration of the properties of various solvents, the properties of electrolytes in non-aqueous solutions, the strength of acids and bases in non-aqueous solvents, and the non-aqueous analogues of the water system of compounds.

Not open to students who have credit form Chemistry 668.

772. Inorganic Chemistry: Laboratory. Three credit hours. Spring Quarter. Nine laboratory hours each week. Mr. Lassettre.

a. Inorganic Preparations. Methods employed in the preparation of pure inorganic compounds. The chief classes of such compounds. The laboratory preparation of a number of ex-

* Not given in 1946-1947.

amples sufficient to develop reasonable technique in applying the methods and to illustrate the classes.

b. Rare Elements. Laboratory work illustrative of the chemistry of the less familiar elements. The preparation of pure compounds of the rare elements using in many cases ores or industrial concentrates as starting materials.

c. Advanced Techniques. The use of some of the newer and more difficult techniques in the field of inorganic syntheses. These techniques include the use of liquefied gases, low and high temperature apparatus, high pressure and high vacua apparatus, etc.

Not open to students who have credit for Chemistry 672.

782. Chemical Bibliography. One credit hour. Autumn Quarter. One conference each week. General prerequisites must include acceptable courses in analytical and organic chemistry. Mr. Brode.

Designed to train the advanced student in the use of the chemical library, and to instruct him in the character of various chemical journals, dictionaries, reference books, and other sources of information pertaining to chemical subjects.

784. History of Chemistry. Two credit hours. Spring Quarter. Two lectures each week. General prerequisites must include acceptable courses in analytical and organic chemistry. Mr. Mack.

A general course in the history of chemistry with special reference to the development of the theories of the science.

787-788-789. Thermodynamics. Three credit hours. Autumn, Winter, and Spring Quarters. An elective for Bachelor of Science seniors who have a grade of "B" or better in Chemistry 681-682-683. Mr. Johnston, Mr. Lassettre.

Training in the use of thermodynamics as a tool for solving chemical problems. Topics to be discussed include: vapor pressure; solutions and solubility; molecular spectra; free energy; modern theories of electrolytic dissociation; galvanic cells; and the various features associated with the measurement and control of chemical equilibria.

Not open to students who have credit for Chemistry 887-888-889.

795. Colloid Chemistry. Three credit hours. Winter Quarter. Three lectures or recitations each week. General prerequisites must include acceptable courses in physical chemistry or their equivalent. Mr. France.

A fundamental course in colloid chemistry.

Not open to students who have credit for Chemistry 695.

796. Theoretical Electrochemistry. Three credit hours. Autumn Quarter. Three lectures or recitations each week. General prerequisites must include acceptable courses in physical chemistry or their equivalent. Mr. France.

A fundamental course in theoretical electrochemistry.

Not open to students who have credit for Chemistry 696.

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Education, Course 684.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

These prerequisites include a thorough preparation in general inorganic chemistry, qualitative and quantitative analysis and introductory courses in organic chemistry and in physical chemistry (including laboratory courses in both subjects), acceptable courses in physics and mathematics, including calculus.

801-802-803. Systematic Course in Experimentation. Three credit hours. Autumn, Winter and Spring Quarters. Nine laboratory hours each week, including informal conferences. Required of all graduate students intending to become candidates for the Ph.D. degree. Mr. Harris, Mr. Henne, Mr. Brode, Mr. MacNevin, and Department Staff.

A training in the fundamental experimental technique of chemical research. Glassblowing, some shop practice, high vacuum techniques, construction of furnaces, measurement and control of temperature, electrical and optical instruments, fractional distillation and crystallization, criteria of purity, calibration, study of errors, micro manipulation, etc.

*822. **Seminar in Analytical Chemistry.** Two credit hours. Winter Quarter. Two conferences each week. Mr. Wirth.

*823. **Seminar in Analytical Chemistry.** Two credit hours. Spring Quarter. Two conferences each week. Mr. Moyer.

*824. **Seminar in Analytical Chemistry.** Two credit hours. Autumn Quarter. Two conferences each week. Mr. MacNevin.

841. **Advanced Organic Chemistry.** Three credit hours. Autumn Quarter. Three lectures each week.

An advanced course in the fundamental principles of organic chemistry, covering the chain hydrocarbons and their derivatives.

842. **Advanced Organic Chemistry.** Three credit hours. Winter Quarter. Three lectures each week.

A continuation of Chemistry 841, covering the carbocyclic compounds, including aromatic, hydroaromatic, and terpene derivatives.

843. **Advanced Organic Chemistry.** Three credit hours. Spring Quarter. Three lectures each week.

A continuation of Chemistry 841 and 842 covering the heterocyclic compounds with special emphasis upon nitrogen derivatives.

844-845. Advanced Organic Chemistry: Laboratory: Three credit hours. Chemistry 844, Spring Quarter and 845, Autumn Quarter. Nine hours of library, conference, and laboratory work each week. Chemistry 841 and 842 must be included in the general prerequisites or taken concurrently. Mr. Newman, Mr. Henne.

An advanced course in the synthesis of aliphatic (844) and aromatic (845) compounds and a study of their chemical characteristics. Selection may be made from the following topics to supplement the student's previous training and to develop his laboratory technique:

I. Synthetic Preparations, involving the use of the standard procedures for alkylation, esterification, condensation, ring closure, oxidation, reduction and nuclear substitution. Particular emphasis will be placed upon the yields and purity of products.

II. Special Methods and Techniques.

a. Catalytic hydrogenation.
b. Electro-chemical preparations.
c. Resolution of optically active compounds.
d. Preparation of research intermediates.

These courses lead directly to minor research problems in the field of organic chemistry.

847. **Theoretical Organic Chemistry.** Three credit hours. Autumn Quarter. Three lectures or discussions each week. General prerequisites must include one year of graduate work in chemistry including Chemistry 841 and 842 or their equivalent.

A discussion of the structural theory of organic chemistry, tetravalent carbon, homology, chemical and physical isomerism and stereochemistry.

848. **Theoretical Organic Chemistry.** Three credit hours. Winter Quarter. Three lectures or discussions each week. General prerequisites must include one year of graduate work in chemistry including Chemistry 841 and 842 or their equivalent.

A discussion of molecular rearrangements, including the theories which have been evolved for their explanation.

849. **Theoretical Organic Chemistry.** Three credit hours. Spring Quarter. Three lectures or discussions each week. General prerequisites must include one year of graduate work in chemistry including Chemistry 841 and 842 or their equivalent.

A discussion of the nature and types of organic reactions, including theories and reaction mechanism.

* Not given in 1946-1947.

850. Seminar in Organic Chemistry. Three credit hours. Winter Quarter. Three conference hours each week. General prerequisites must include Chemistry 841 and 842. Mr. Wolfrom.

Topic for 1946-1947: The Chemistry of Carbohydrates.

*851. Seminar in Organic Chemistry. Three credit hours. Three conference hours each week. General prerequisites must include Chemistry 841 and 842. Mr. Boord.

852. Seminar in Organic Chemistry. Three credit hours. Spring Quarter. Three conference hours each week. General prerequisites must include Chemistry 841 and 842. Mr. Newman.

Topic for 1946-1947: Steric Hindrance and Strains.

*853. Seminar in Organic Chemistry. Three credit hours. Three conferences each week. General prerequisites must include Chemistry 841 and 842. Mr. Henne.

854. Seminar in Organic Chemistry. Three credit hours. Autumn Quarter. Three conference hours each week. General prerequisites must include Chemistry 841 and 842. Mr. Brode.

Topic for 1946-1947: To be announced.

Open to auditors and advanced students not working for credit.

855. Seminar in Organic Chemistry. Two credit hours. Spring Quarter. General prerequisites must include Chemistry 841 and 842. Mr. Haskins.

Topic for 1946-1947: Cellulose and its derivatives.

†858. Seminar in Organic Chemistry. Two credit hours.

861. Quantum Chemistry. Three credit hours. Autumn Quarter. Three lectures each week. Mr. Lassettre.

The modern theory of the chemical bond is given and accompanied by a discussion of experimental results of the structures and properties of inorganic compounds of elements in the first period of the periodic classification. The following topics are treated: resonance energies, interatomic distances, bond energies, ionic character of covalent bonds, structures of simple inorganic substances.

862. Quantum Chemistry. Three credit hours. Winter Quarter. Three lectures each week. Mr. Lassettre.

A continuation of Chemistry 861. The following topics are discussed: directed covalent bonds involving d orbitals, structures of molecules and crystals, structures of ionic crystals, thermodynamic properties of gases as related to their structures.

863. Quantum Chemistry. Three credit hours. Spring Quarter. Three lectures each week. Mr. Lassettre.

A continuation of Chemistry 862. The structures and properties of metals and alloys, the electronic theory of metals.

881. Chemical Kinetics. Three credit hours. Autumn Quarter. General prerequisites must include Chemistry 681-682-683. Mr. Verhoek.

A study of the velocity of chemical reactions in both homogeneous and heterogeneous systems, chiefly for gaseous reactions.

885. Molecular Spectra and Structure. Three credit hours. Winter Quarter. General prerequisites must include Chemistry 647-648, 681-682-683 and Physics 626 and 627. Mr. MacWood.

Molecular structure is taken up from the quantum standpoint with particular emphasis on band spectra, the correlation of atomic and molecular electronic states, energy level diagrams worked out for some typical molecules, potential energy curves, optical dissociation, predissassociation, fluorescence and Raman spectra, infra-red absorption, continuous absorption, isotope effects, ortho and para molecular states, the determination of bond distances and bond angles, quantum mechanical resonance, the strengths of linkage in organic molecules, and applications to chemical thermo-dynamics and photo-kinetics.

* Not given in 1946-1947.

† Not given during the academic year, 1946-1947.

890. Seminar in Physical Chemistry. Three credit hours. Spring Quarter. Three conferences each week. Mr. Johnston.

891. Seminar in Colloid Chemistry and Electrochemistry. Three credit hours. Spring Quarter. Three conferences each week. Mr. France.

892. Seminar in Physical Chemistry. Three credit hours. Autumn Quarter. Three conferences each week. General prerequisites must include Chemistry 681-682-683. Mr. Harris.

Topic for 1946-1947: X-ray Scattering.

893. Seminar in Physical Chemistry. Three credit hours. Spring Quarter. Three conferences each week. General prerequisites must include Chemistry 681-682-683. Mr. Lassettre.

Topic for 1946-1947: Scattering of Electrons by Gases.

***894. Seminar in Physical Chemistry.** Two credit hours. Winter Quarter. Two conferences each week. General prerequisites must include Chemistry 681-682-683. Mr. Verhoek.

895. Seminar in Physical Chemistry. Two credit hours. Winter Quarter. Two conferences each week. General prerequisites must include Chemistry 681-682-683. Mr. Garrett.

Topic for 1946-1947: Catalysis.

896. Seminar in Physical Chemistry. Two credit hours. Winter Quarter. Two conferences each week. General prerequisites must include Chemistry 787-788-789. Mr. MacWood.

Topic for 1946-1947: To be announced.

***897. Seminar in Chemistry.** One credit hour. Autumn Quarter. One conference each week. Mr. Mack.

950. Research in Chemistry. Autumn, Winter, and Spring Quarters. Library, conference, and laboratory work. General prerequisites must include acceptable courses in the chosen field of research. The student may spend a part or all of his time on research work. Department Staff.

Research is carried on in the fields of analytical, inorganic, organic and physical chemistry, and in colloid and electrochemistry.

NOTE: Attention is called to the fact that courses in physiological chemistry are listed elsewhere in this Bulletin under the Department of Physiological Chemistry and Pharmacology.

NOTE: For Industrial Chemistry, Applied Electrochemistry, and Chemical Engineering Courses see the Department of Chemical Engineering.

CIVIL ENGINEERING

Office, 107 Brown Hall

PROFESSORS MORRIS, CODDINGTON, (EMERITUS), SLOANE, SHANK, PRIOR, LARGE AND MARSHALL, ASSOCIATE PROFESSORS MONTZ AND WALL, ASSISTANT PROFESSORS JOHNSTONE AND BIRD

600 and 700 courses do not carry graduate credit if these courses or their equivalents were used in fulfilling the requirements for the Bachelor's degree.

In addition to the requirements found elsewhere in this bulletin, the candidate for an advanced degree shall have received a Bachelor's degree in some branch of engineering or in the fundamental engineering sciences from a recognized engineering school plus satisfactory engineering experience.

It is important that the candidate's record in the fundamental subjects of Mathematics, Physics, and also in Chemistry in certain fields of engineering, be well above the average.

A graduate student may prosecute studies in the following branches in the field of Civil Engineering: (a) Structural Engineering, (b) Sanitary Engineering and Water Supply Engi-

* Not given in 1946-1947.

neering, (c) Highway Engineering, (d) Transportation Engineering, (e) Geodetic Engineering and Photogrammetry.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

609. Adjustment of Observations. Three credit hours. Winter Quater. Three two-hour laboratory periods each week. General prerequisites must include analytic geometry, railroad surveying and advanced surveying. Mr. Marshall, Mr. Montz.

Theory of adjustment of observations, using work of preceding term; precise maps.

610. Cement and Concrete. Four credit hours. Winter Quarter. Two recitations and two laboratory periods each week. General prerequisites must include Mechanics 602. Mr. Large, Mr. Bird.

A study of concrete materials and mixtures.

612. Foundations. Four credit hours. Autumn Quarter. One lecture, one recitation, and two laboratory periods each week. General prerequisites must include Civil Engineering 610 and Mechanics 602 and 610. Mr. Large, Mr. Bird.

Atterburgs, capillarity, permeability, Proctor Compaction, consolidation and Shear tests. Stress distribution. Applications to foundations, piling, caissons, and embankments.

701. Reinforced Concrete Design. Five credit hours. Spring Quarter. Three recitations and two three-hour laboratory periods each week. General prerequisites must include Civil Engineering 610 or a course in cement and concrete; Mechanics 605 must be included in the general prerequisites or taken concurrently. Mr. Large.

Theory and design of reinforced concrete structures.

703. Water Supply Engineering. Five credit hours. Spring Quarter. Five recitations each week. General prerequisites must include Mechanics 605 and 610. Mr. Prior.

Construction and operation of public water supplies.

705. Masonry Structures. Five credit hours. Autumn Quarter. Five recitations each week. General prerequisites must include Civil Engineering 612 and 701. Mr. Prior.

Application of principles of civil engineering to various masonry structures.

709. Geodetic Engineering. Three credit hours. Spring Quarter. Three lectures each week. General preprequisites must include Civil Engineering 609. Mr. Marshall.

Trigonometric reconnaissance, use of geographic coordinates, and problems involving figure of the earth.

711. Elementary Structural Engineering. Three credit hours. Spring Quarter. Three recitations each week. General prerequisites must include Mechanics 602. Mr. Shank.

Theory and design of steel and reinforced concrete beams, columns and trusses.

712. Trusses. Five credit hours. Autumn Quarter. Five recitations each week. General prerequisites must include Mechanics 602. Mr. Shank, Mr. Large.

Stresses in and design of simple steel trusses and building frames.

715. Timber Construction. Five credit hours. Winter Quarter. Three recitations and two three-hour laboratory periods each week. General prerequisites must include Mechanics 601 and 602. Mr. Sloane, Mr. Montz.

Lectures on wood and its application to design of engineering structures.

716. Sanitary Engineering. Five credit hours. Winter Quarter. Five recitations each week. General prerequisites must include Mechanics 610. Mr. Prior.

Lectures and recitations upon sewerage systems, sewage and sewage treatment.

Not open to students who have credit for Civil Engineering 602.

717. Framed Structures. Five credit hours. Winter Quarter. Five recitations and ten hours of preparation each week. General prerequisites must include Mechanics 602. Mr. Shank.

An elementary course in stresses and design of welded and riveted steel trusses and steel and concrete frames.

730. Transportation Engineering. Three credit hours. Autumn Quarter. Three recitations each week. General prerequisites must include Civil Engineering 604 and 605. Mr. Montz.

Engineering costs illustrated by rail, highway, water and air transportation.

732. Contracts and Specifications. Three credit hours. Spring Quarter. Three recitations each week. Mr. Johnstone.

Professional practice and principles underlying engineering contracts and specifications.

733. Rigid Frame Structures. Three credit hours. Autumn Quarter. Three recitations each week. General prerequisites must include Civil Engineering 712 or 613. Mr. Large, Mr. Morris.

Stresses in and design of steel-frame office buildings.

734. Advanced Bridges. Three credit hours. Winter Quarter. Three recitations each week. General prerequisites must include Civil Engineering 613 or 712. Mr. Morris.

Stresses in and design of arch bridges.

738. Highway Plans and Surveys. Three credit hours. Autumn Quarter. One recitation and two three-hour laboratory periods each week. General prerequisites must include courses in roads and pavements. Mr. Sloane.

Reconnoissance and location surveys, alignment and grades, curve widening and superelevation, bridge and culvert surveys, preparation of plans and estimates, study of highway standards.

739. Bituminous Roads and Surfaces. Three credit hours. Spring Quarter. One recitation and two three-hour laboratory periods each week. General prerequisites must include a course in roads and pavements. Mr. Sloane.

Study of various types of bituminous roads now in use, plant layout and construction details, analysis of specifications and study of current literature on maintenance, renewals and surface treatments, laboratory tests of asphalts, tars, and oils.

799. Advanced Civil Engineering. Three to five credit hours. Autumn, Winter, and Spring Quarters. In addition to the general prerequisites, permission of the chairman of the department. All instructors.

This course is intended to give the advanced student opportunity to pursue advanced study. Work undertaken may be elected in the field of highways, structures, sanitary engineering, water supply, geodetic engineering, transportation, and other special fields in civil engineering.

(a) Advanced Reinforced Concrete Design.

(b) Aircraft Structural Design.

(c) Advanced Structural Design.

(d) Advanced Sanitary Engineers.

(e) Advanced Transportation Engineering.

(f) Photogrammetry.

(g) River Hydrology.

A student may repeat this course until he has obtained a maximum of twenty credit hours. He may accumulate not more than ten credit hours in any one of the above subdivisions.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

809. Photogrammetry. Three to five credit hours. Spring Quarter. Recitations and laboratory arranged according to credit hours received. General prerequisites must include Civil Engineering 609. Mr. Marshall.

Recitations and laboratory instruction in graphical and analytical control of air photographs, preparation of planimetric maps and mosaics, stereoscopic plotting instruments.

830. Advanced Transportation Engineering. Three credit hours. Autumn Quarter. Three recitations. General prerequisites must include Civil Engineering 604 and 605. Mr. Montz.

Advanced problems in railway and highway transportation costs.

834. Advanced Structural Engineering. Three credit hours. Autumn Quarter. Three recitations and six hours of preparation each week. General prerequisites must include Civil Engineering 613. Mr. Morris.

Stresses in and design of continuous structures.

840. Advanced Sanitary Engineering. Three to five credit hours. Autumn Quarter. Recitations to be arranged according to credit hours received. General prerequisites must include Civil Engineering 703 and 716. Mr. Prior.

Advanced problems in sanitary engineering.

842. Applied Hydrology. Three to five credit hours. Spring Quarter Recitations to be arranged according to credit hours received. General prerequisites must include Mechanics 610. Mr. Johnstone.

Regimen of natural streams; flood routing; rainfall-runoff relationship; flood prediction; flood control; and control of alluvial streams.

950. Research in Civil Engineering. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. All instructors.

CLASSICAL LANGUAGES AND LITERATURE
Office, 217 Derby Hall

PROFESSORS TITCHENER, HODGMAN (EMERITUS), AND BOLLING (EMERITUS), ASSOCIATE PROFESSORS HOUGH AND ABBOTT, ASSISTANT PROFESSOR JONES

(See page 63 for the program in Ancient History and Literature.)

Prerequisites for Admission to Graduate Work: The student must have an undergraduate major (or its equivalent) in a university or college of recognized standing. In case of question, the Department will offer a proficiency examination.

The field of study in the Department of Classical Languages includes all classical antiquity. Basic courses deal with the literature or literatures, the science of language study and methods of research, including an introduction to textual criticism. Specialization, particularly in the final year of graduate work, may lead to literary, linguistic, social, historical, economic or other aspects of ancient civilization.

Requirements for the Master's Degree: (a) *History and criticism of Latin (or Greek) literature.* If Latin is the major study, Greek is strongly advised but not required. (b) *Linguistic and Archaeology.* If one language only is studied, linguistics and archaeology must be substituted for the second language. (c) At least two Quarters of *methods of research.*

Requirements for the Degree Doctor of Philosophy: *General Examinations* — These general examinations, written and oral, are planned to determine the candidate's ability in the translation of Greek and Latin, knowledge of literary history, and specialized knowledge of a single author, chosen by the candidate in consultation with his adviser. Auxiliary fields, such as linguistics, archaeology, bibliography, and ancient history, will be included and in individual cases such specialized subjects as palaeography, epigraphy, metrics, etc. (b) A wide knowledge of one literature, based on extensive reading, and a sound reading knowledge of the second. At least three Quarters of linguistics.

GREEK

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

610. Private Reading and Minor Problems. Two to five credit hours. One Quarter. Autumn, Winter, Spring. General prerequisites should include a course in Homer. Mr. Hough, Mr. Jones.

Passages for private reading and topics for investigation will be suggested to meet the needs of individual students.

NOTE: For course in Principles of the Historical Study of Language, see German 705.

LATIN

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

608. Roman Art and Archaeology. Three credit hours. Winter Quarter. Three lectures each week. General prerequisites must include for majors in Classical Languages, six Quarters of college Latin; for Fine Arts students, a course in the history of fine arts; other qualified students may be admitted by special arrangement. Mr. Hough.

Study of Roman architecture, sculpture, and painting. Lectures, discussions and reports on special topics.

612. Latin Prose Composition: First Course. Three credit hours. Winter Quarter. Three recitations each week. General prerequisites must include five Quarters of college Latin. Mr. Abbott.

Exercises and lectures on Latin idiom and style.

615. Proseminar I. Three credit hours. Winter Quarter. Three lectures each week. General prerequisites must include six Quarters of college Latin. Mr. Abbott, Mr. Hough.

Lectures on the life and period of Cicero; readings from the Letters and Essays. Latin 615 is designed especially for students preparing to teach Latin.

616. Proseminar II. Three credit hours. Spring Quarter. Three lectures each week. General prerequisites must include six Quarters of college Latin. Mr. Abbott, Mr. Hough.

Lectures on the life and works of Vergil, and his influence on modern literature; readings from the Eclogues and the Georgics. Latin 616 is designed especially for students preparing to teach Latin.

617. Proseminar III. Three credit hours. Autumn Quarter. Three lectures each week. General prerequisites must include six Quarters in college Latin. Mr. Hough.

Lectures on topics suggested by the study of Caesar's Gallic and Civil Wars; special consideration of literary style, political and military campaigns. Latin 617 is designed especially for students preparing to teach Latin.

627. Vulgar Latin. Three credit hours. Winter Quarter. General prerequisites must include six Quarters of college Latin, or French 801, or the consent of the instructor must be obtained. Mr. Abbott.

Lectures and the study of texts and inscriptions illustrating the development of the popular speech.

631. Private Reading and Minor Problems. One to six credit hours. One Quarter. Autumn, Winter, Spring. General prerequisites must include one reading course more advanced than Latin comedy. Mr. Titchener, Mr. Hough, Mr. Abbott.

Passages for private reading and topics for investigation will be suggested to meet the needs of individual students.

650-651-652. History of Roman Literature. Three credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include three reading courses more advanced than Latin comedy. The content of the readings within this course is so extensive that graduate students may repeat this course for credit. Mr. Titchener.

Lectures and assigned reading in literary histories on the development of Roman literature; required and suggested passages for translation in each author studied: brief weekly reports.

720. Introduction to Historical Greek and Latin Grammar. Three credit hours. Autumn Quarter. General prerequisites must include ten hours of advanced work in the classics. Mr. Abbott.

721-722. Historical Greek and Latin Grammar. Three credit hours each Quarter. Winter and Spring Quarters. General prerequisites must include ten hours of advanced work in the classics. Mr. Abbott.

*755. Advanced Archaeology. Three credit hours. Spring Quarter. General prerequisites must include ten hours of Classical Languages or the history of the fine arts. Mr. Hough.

Lectures and reports in the fields of painting, sculpture, architecture and archaeology. Particular attention will be given to the topopgraphy and excavations of the city of Rome.

Not open to students who have credit for Latin 655.

*756. Advanced Archaeology. Three credit hours. Winter Quarter. General prerequisites must include ten hours of Classical Languages or the history of the fine arts. Mr. Hough.

Not open to students who have credit for Latin 656.

NOTE: TEACHING COURSE. For the Teaching Course in this department see the Department of Education, Course 694.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

800. Seminar. Three credit hours. Autumn, Winter, and Spring Quarters. Mr. Titchener, Mr. Hough, Mr. Abbott.

Textual criticism and research problems. The author to be studied will be assigned by the instructor.

950. Research in Classical Languages. Autumn, Winter, and Spring Quarters. The staff.

COMPARATIVE LITERATURE AND LANGUAGE

Courses formerly offered under the above heading will be found under the Departments of Classical Languages and Literature, and German.

DAIRY SCIENCE

Advisory Committee: Robert B. Stoltz, Louis H. Burgwald, Dairy Technology: Thomas S. Sutton, Animal Husbandry; John F. Lyman, Agricultural Chemistry; Harry H. Weiser, Bacteriology; and W. E. Krauss, Ohio Agricultural Experiment Station.

Graduate instruction leading to the Ph.D. degree in Dairy Science is administered by an inter-departmental advisory committee representing the departments concerned. This inter-departmental program is available only to students who are candidates for a Ph.D. degree in Dairy Science. Students interested in a Master's degree in any phase of dairy science must select the appropriate departments in which to secure that degree. The graduate courses in dairy science are listed under four different departments: (1) Agricultural Chemistry; (2) Animal Husbandry; (3) Bacteriology; and (4) Dairy Technology. A candidate for the Ph. D. degree in Dairy Science may select from these and cognate courses those which provide the preparation which he desires.

* Not given in 1946-1947.

Prerequisites. Applicants for admission to a program of graduate study leading to a Ph.D. degree in Dairy Science must have completed the requirements for a Master's degree in some field of dairy science such as dairy technology, dairy chemistry, dairy bacteriology, animal nutrition, etc., or present evidence of equivalent experience and training.

Before a candidate for a Ph.D. degree in Dairy Science can take the general examination for that degree he must have satisfactorily completed the following work or its equivalent in courses open to advanced undergraduates and graduates or those open only to graduates: (1) organic chemistry, 10 hours; (2) physical chemistry, 5 hours; (3) colloidal chemistry, 3 hours; (4) biological chemistry, 5 hours; (5) dairy chemistry, 10 hours; (6) chemistry of nutrition, 5 hours; (7) bacteriology, 17 hours; (8) dairy technology and dairy production, 20 hours.

The general written examination for the Ph.D. degree in Dairy Science will cover the following special fields: (1) dairy technology and dairy production; (2) organic, physical, colloidal, physiological and dairy chemistry; (3) general and dairy bacteriology; (4) human and animal nutrition.

Dissertation. The subject of the dissertation may be chosen from any field of dairy science after consultation with the Advisory Committee and it must be approved by the Advisory Committee. The adviser immediately in charge of the dissertation will be selected by the Advisory Committee in consultation with the student.

Before undertaking a program of graduate study designed to lead to a Ph.D. degree in Dairy Science, a student must carefully outline his entire program and have it approved by the Advisory Committee.

For courses which should be elected as preparation for a Ph. D. degree in Dairy Science reference should be made to the departmental announcements of Agricultural Chemistry, Animal Husbandry, Bacteriology, and Dairy Technology.

DAIRY TECHNOLOGY

Office, 111 Townshend Hall

PROFESSORS STOLTZ AND BURGWALD, ASSOCIATE PROFESSOR JOSEPHSON, ASSISTANT PROFESSORS SLATTER AND LARSON

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

605. Management of Dairy Plants. Five credit hours. Winter Quarter. Three discussion periods and one four-hour laboratory period each week. General prerequisites must include Dairy Technology 607 and 610. Dairy Technology 608 must be included in the general prerequisites or taken concurrently. Mr. Stoltz.

Lectures will be given on the organization, construction, and operation of milk plants, creameries, cheese factories, condenseries, and ice cream plants. The purchasing of milk and milk products by various methods, the importance of sanitation, employing of help, and the purchasing of supplies will be discussed. Trips will be taken to various plants weekly and written reports will be required regarding the efficiency and housekeeping of plants visited.

606. Dairy Equipment. Three credit hours. Spring Quarter. Three class meetings each week. General prerequisites must include elementary courses in physics. Mr. Slatter.

A study of the principles of construction, operation, and maintenance of dairy plant equipment including pasteurizers, bottle washers, can washers, homogenizers, milk coolers, separators, churns, pumps, sanitary pipe lines, etc. Elements to be considered in the design and construction of the dairy plant will be included.

607. Market Milk. Five credit hours. Autumn Quarter. Three discussion periods and two three-hour laboratory periods each week. General prerequisites must include Bacteriology 607, 610, 611. Mr. Burgwald.

This course deals with the fluid industry, including processing and distribution of milk and cream for city trade. Considerable attention will be given to plant operations and problems pertaining thereto. The laboratory work will consist of the application of bacteriology and chemistry to the production of quality products. Training and practice will be given in milk inspection from the standpoint of the Board of Health and the city milk plant.

608. Hard Cheese Manufacturing. Five credit hours. Winter Quarter. Two discussion periods and one eight-hour laboratory period each week. General prerequisites must include Bacteriology 607, 610, and 611. Mr. Slatter.

Lectures will take up the methods of manufacturing cheddar, Swiss, brick, and Limburger cheese, the method of paying for milk at cooperative cheese factories and the scoring of American cheese. Laboratory work will consist of the making of cheddar cheese from both raw and pasteurized milk, Swiss cheese by the use of the eye-forming culture, brick, Limburger, and farm cheese.

609. Condensed Milk and Dry Milk. Three credit hours. Autumn Quarter. Two discussion periods and one three-hour laboratory period each week. General prerequisites must include Bacteriology 607 and a course in dairy chemistry. Mr. Josephson.

A study of condensed milk and dry milk manufacture. Special emphasis will be given to the questions of heat stability of milk, the salt balance, and lactose crystallization. Laboratory work will consist of practical work in the operation of vacuum pans, sterilization of milk, and visits to milk condenseries and powder plants in the vicinity of Columbus.

610. Ice Cream Manufacturing. Five credit hours. Autumn Quarter. Three discussion periods and two three-hour laboratory periods each week. General prerequisites must include Bacteriology 607 and a course in dairy chemistry. Dairy Technology 609 must be taken concurrently. Mr. Josephson.

The course deals with the modern ice cream industry and has to do with manufacturing operations, distribution methods and sales activities. Considerable attention is given to the physico-chemical aspects of ice cream and how these enter into modern processing procedure. Laboratory work consists of processing ice cream and visiting manufacturing plants.

615. Dairy Products Scoring. Three credit hours. Spring Quarter. One lecture and two two-hour laboratory periods each week. Mr. Burgwald.

An advanced class for students who are majoring in dairy technology and who desire to take up judging of milk, butter, ice cream, and cheese in the commercial field.

701. Special Problems. Three to fifteen credit hours, taken in units of three or five hours each Quarter, for one or more Quarters. Autumn, Winter, Spring. One hour conference each week. Mr. Stoltz, Mr. Burgwald, Mr. Josephson, Mr. Slatter.

This course is designed for students majoring in dairy technology and consists in working out special problems along the lines in which they are specializing.

702. Dairy Seminar. One credit hour. Autumn, Winter, and Spring Quarters. One hour conference each week. Open to seniors and graduate students who are specializing in dairy technology and to those who have permission of the instructor. During this seminar seniors will report on problems or special references. Graduate students will make a report of their problems. Instructors in allied departments of the University will be requested to take part in this seminar.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

950. Research in Dairy Technology. Autumn, Winter, and Spring Quarters. One hour conference each week. General prerequisites must include at least twenty hours of work in the department, and the consent of the instructor must be obtained. Mr. Stoltz, Mr. Burgwald, Mr. Josephson, Mr. Slatter.

Research work in Dairy Technology is conducted under the supervision of Mr. Stoltz, Mr. Burgwald, Mr. Josephson, and Mr. Slatter. Any apparatus or equipment on hand will be furnished and room will be arranged for those desirous of studying problems pertaining to market milk, ice cream, butter, cheese, evaporated milk, milk powder, buttermilk, or other dairy products. Students desiring to work on some problems, such as plant management, dairy bacteriology, dairy chemistry, nutrition, cost accounting, can arrange to carry on the work as though it were in one department and college.

DENTISTRY

Office, 117 Hamilton Hall

PROFESSORS POSTLE, SNYDER, JONES, KITCHIN, HEBBLE, BOUCHER, STROSNIDER, ROBINSON, ARNIM, AND STARR, ASSOCIATE PROFESSORS STEFFEL, PETTIT, KAISER, AND SPANGENBERG, ASSISTANT PROFESSORS WADE, RIFE, MARSHALL, CROW, DEW, AND TRIPPY

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

These prerequisites include adequate preparation in technical courses concerned.

701-702-703. Minor Problems in Operative Dentistry. One to three credit hours. Autumn, Winter, and Spring Quarters.

Students will have assigned to them special problems in Operative Dentistry.

704-705-706. Minor Problems in Prosthetic Dentistry. One to three credit hours. Autumn, Winter, and Spring Quarters.

Students will have assigned to them special problems in Prosthesis.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

801. Special Problems in Clinical Oral Surgery and Anesthesia. One to five credit hours. Repeated in Autumn, Winter, and Spring Quarters for two years. Required of all students majoring in Oral Surgery. Mr. Snyder, Mr. Spangenberg.

The importance of accurate diagnosis and good judgment in bringing the treatment of surgical conditions of the teeth and contiguous structures to a satisfactory conclusion will be stressed. Advanced surgical techniques and practical procedures with special emphasis on the related basic fields of anatomy, physiology, and pathology. Recent advances in local and general anesthesia and their relation to practical procedures will be considered.

802. Special Problems in Clinical Orthodontics. One to five credit hours. Repeated in Autumn, Winter, and Spring Quarters for two years. Required of all students majoring in Orthodontics. Mr. Jones, Mr. Wade.

The construction of special appliances. The manipulation of appliances in treatment of dental and associated deformities. Consideration of growth problems in relation to orthodontic procedures.

803. Special Problems in Clinical Periodontia. One to five credit hours. Repeated in Autumn, Winter, and Spring Quarters for two years. Required of all students majoring in Periodontia. Mr. Spangenberg.

Diagnosis and treatment of Periodontal disease. Emphasis will be placed on correlation between the diseases of the periodontium to probable systematic maladjustments as well as maladjustments of a purely dental nature.

804. Histological Laboratory Technique. One to three credit hours. Autumn and Winter Quarters. Required of all graduate students in Dentistry. Mr. Kitchin.

The preparation of oral and dental tissues for microscopic study, including tissue fixation, grinding of tooth and bone sections, decalcification of combined hard and soft tissues with subsequent celloidin embedding, paraffin embedding of soft tissues, cutting of embedded material, staining and mounting and study of sections.

805. Seminar in Dentistry. One credit hour. Repeated in Autumn, Winter, and Spring Quarters for two years. One seminar each week. Required of all graduate students in Dentistry. Mr. Jones, Mr. Snyder, Mr. Kitchin, Mr. Spangenberg, Mr. Boucher, Mr. Robinson.

The purpose of these seminars is to acquaint those whose interest is specialized with recent advances in all branches of dental science. Instructors and students will participate and subjects will be assigned with reference to the field of the individual's specialization. Review of original

literature will form a basis for such discussions. The following topics will be considered: (1) Problems in diagnosis and treatment of surgical conditions of the oral cavity and contiguous structures. (2) Correlation of problems in Periodontia with related sciences. Physiology and Pathology of the bone will be considered. The relation of nutrition to Periodontia will be discussed. (3) A study of special topics related to Orthodontics. (4) Problems in Roentgenographic diagnosis will be discussed with special emphasis on existing microscopic pathology. (b) Discussion of special topics in the fields of Dental Histology and Embryology.

806. Special Problems in Clinical Prosthetic Dentistry. One to five credit hours. Repeated in Autumn, Winter, and Spring Quarters for two years. Required of all students majoring in Prosthesis. Mr. Boucher.

The diagnosis and treatment of lost or congenitally absent parts of the mouth and face by means of prosthetic appliances. The construction of special prosthetic appliances.

807. Special Problems in Oral Pathology and Diagnosis. One to six credit hours. Repeated in Autumn, Winter, and Spring Quarters for two years. Mr. Robinson.

The interrelationships of gross, microscopic, and clinical pathology will be stressed. Functional, as well as morphologic, changes will be considered with evaluation of their importance in diagnosis of oral disease. Current advances in the field of oral pathology and diagnosis will be discussed. An oral pathology conference will be repeated for one hour each week in the Autumn, Winter and Spring Quarters. Microscopic material from clinical biopsies will be reviewed as received and supplemented by material from the Registry of Oral and Dental Pathology of the Army Pathology Institute and from other sources.

950. Research. Credits to be arranged. Autumn, Winter, and Spring Quarters.

Original work to supply the basis for a thesis.

DRAWING

(See Engineering Drawing)

ECONOMICS

Office, 101A Commerce Building

PROFESSORS BOWERS, WOLFE, HAYES, DICE, KIBLER, SALZ, SMART, JAMES, HERBST, AND PATTON, ASSOCIATE PROFESSORS BITTERMANN, ROWNTREE, AND LEY, ASSISTANT PROFESSORE EGLE, KIMBALL, WELSH, HARRISON AND STEVENS

Prerequisites for Graduate Work: The undergraduate preparation for students specializing in economics should include in addition to basic courses in economics, elementary courses in at least five of the following subjects: accounting, anthropology, business organization, geography, history, mathematics, philosophy, political science, psychology, and sociology. When undergraduate preparation is inadequate, in the judgment of the committee, courses in economics or related subjects may be required in addition to the ordinary requirements for degrees.

Departmental Committee on Graduate Work: The departmental committee on graduate work has general supervision of the programs of students regularly admitted to the Graduate School, who wish to take advanced degrees in economics. Students should report to the chairman of this committee early in their first Quarter of residence.

MASTER'S DEGREE: The candidate for the Master's degree in economics must meet certain minimum requirements: (1) in the general principles of economics; (2) in the history of economic thought and processes, for which Economics 801-802-803 or its equivalent is necessary; (3) in elementary statistics; (4) an adequate preparation in the field of the thesis satisfactory to the thesis advisers.

Satisfaction of the first three requirements will be determined on the basis of a written examination given in the fourth week of the Quarter in which the degree is to be taken. Students will not be admitted to candidacy until the topics of their theses have been approved by the departmental committee on graduate work.

DOCTOR'S DEGREE: The candidate for the Doctor's degree in economics should have a broad and liberal training, such as will enable him to approach his work in a scientific, critical, and constructive spirit; and from a broad social point of view rather than from that of a narrow special interest. In order to attain this point of view, he should have gained familiarity with the progress which has been made not only in economics but also in the other social sciences, as well as in philosophy and psychology. A reasonable acquaintance with European and American history is presupposed. The candidate should have an elementary knowledge of calculus, and shall have a knowledge of statistics at least equivalent to Economics 710-711-712. He shall have a

reading knowledge of two foreign languages acceptable to the committee on graduate work, preferably French and German.

The more specific requirements for the Doctor's degree in economics include the following:

(1) The minimum requirements for the Master's degree as given above;

(2) Concentration in four of the following fields, one of which shall be Economic Theory; the preparation shall cover the entire field without limitation to particular courses:
- (a) Economic theory;
- (b) Economic history;
- (c) Labor problems and economic reform;
- (d) Theory of money and credit;
- (e) Public finance;
- (f) International economic relations;
- (g) Social control of industry (transportation, public utilities, economic planning);
- (h) Economic Statistics

(3) One or more subjects taken in other departments of the university, selected with the approval of the professor in charge of the candidate's dissertation.

The adequacy of preparation in fields (2) and (3) will be tested by written and oral examinations, which must be passed before admission to candidacy. Topics for dissertations must be approved by the departmental committee on graduate work at least two Quarters before the degree may be taken. Detailed statements of the forms of application for examinations and approval of dissertation topics may be obtained from the chairman of the committee on graduate work.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

601-602-603. Principles of Economics; Advanced Course. Three credit hours. Three Quarters. 601, Autumn; 602, Winter; 603, Spring. Three class meetings each week. Mr. James.

This course is designed to provide a more thorough and critical consideration of economic principles than is possible in the elementary courses. It attempts to arrive at some understanding of the more fundamental principles involved in the present changing economic system.

604-605. Current Economic Problems. Three credit hours. Two Quarters. 604, Autumn; 605, Winter. Three class meetings each week. Mr. Hayes.

A lecture and discussion course providing a survey and analysis of some of the leading current economic issues, especially those connected with the economic functions of the Federal administration, agricultural adjustment, development of natural resources, provision for the aged and unemployed, tariff adjustment, and industrial self-government.

613. Money and Banking: Problems and Policies. Three credit hours. Winter Quarter. Three class meetings each week. General prerequisites must include a course in money and banking or the equivalent. Mr. Dice.

This course is an advanced treatment of certain special problems introduced in Economics 520. Emphasis is placed on recent changes in our monetary and banking system. The functions of Central Banks and the Treasury are analyzed. A survey of the monetary and banking systems of Canada, England, and Russia forms an important section of the course.

Not open to students who have credit for Economics 706.

616. Corporation Economics. Five credit hours. Autumn Quarter. Five meetings each week. Mr. Kimball.

A survey of corporation organization and finance; corporate securities and their uses, corporate income and dividend policies, economic aspects of corporate expansion and combination, corporate reorganizations, economic basis for public regulation of corporations. Designed for students not registered in the College of Commerce and Administration.

Not open to students who have credit for or who are taking Business Organization 650.

618. Transportation Economics. Five credit hours. One Quarter. Winter and Spring. Five class meetings each week. Mr. Kibler.

A general survey of the history and regulation of inland transportation agencies, and a discussion of current problems of transportation and regulation, for students with a general interest in the field of economics as well as for those with a special interest in transportation.

619. Air Transportation. Three credit hours. Autumn Quarter. Three class meetings each week. Mr. Rowntree.

Historical background and economic aspects of air transportation. Routes and services. Interrelationships of air, railroad, highway, and ocean transportation. Airline operating costs in relation to types of equipment and ground facilities. Economic principles of rate-making. Government control and assistance to airline operations.

624. Principles of Insurance. Three credit hours. One Quarter. Autumn, Winter, Spring. Three class meetings each week. Mr. Bowers, Mr. Ley.

A study of the theory and practice of the principal types of insurance in the life, fire, and casualty fields. The economic theory of risk; loss prevention; state supervision, etc.

627. Analysis and Control of Business Cycles. Three credit hours. Spring Quarter. Mr. Hayes.

A general survey of changes in price levels and production. Past and current theories of business cycles. Proposed plans for control of economic fluctuation.

631-632-633. Public Finance. Three credit hours. Three Quarters. 631, Autumn; 632, Winter; 633, Spring. Mr. Smart.

A study of the problems connected with the debts, expenditures, revenues, and fiscal administration of national, state, and municipal governments.

637. Labor Relations. Five credit hours. Autumn Quarter. Five class meetings each week. Miss Herbst.

The problems of labor considered with reference to the labor movement; the history of trade unionism; types; theories; policies; methods; legal status of trade unions; the strike; the boycott; the injunction. Types of governmental intervention.

638. Labor Legislation. Three credit hours. Winter Quarter. Three class meetings each week. Miss Herbst.

State activity in relation to labor. The operation of protective legislation relating to child labor, wages, hours. Special consideration is given to the operation of the federal National Labor Relations Act and the Fair-Labor Standards Act. Reference is made to Ohio statutes and their administration.

639. Social Insurance. Three credit hours. Spring Quarter. Three class meetings each week. Mr. Bowers.

Efforts to guarantee to the worker security. Accident insurance; employers' and workmen's compensation; health hazards and health insurance. Old age insurance and pensions; unemployment and its prevention; unemployment insurance. Compulsory automobile insurance.

640. The International Organization of Labor. Three credit hours. Spring Quarter. Three class meetings each week. Miss Herbst.

American and foreign labor movements are viewed historically in relation to economic, political, and legal institutions. The purposes and problems of trade unionism, political activity, cooperation, and international organization of labor are included.

Not open to students who have credit for Economics 513.

643. Women in the Modern Economic World. Three credit hours. Autumn Quarter. Three class meetings each week. Miss Herbst.

A study of the relation of women to the present economic order and of the social, economic, industrial and legal problems associated therewith.

645. Consumption Economics. Three credit hours. Winter Quarter. Three class meetings each week. Miss Herbst.

Consumption economics from the standpoint of the individual and of society; the consumption problem in the price system; variations and inequalities of income; price levels and the cost of living; influences determining consumer choice; standards of economy of consumption.

648. Public Utility Economics. Five credit hours. Autumn Quarter. Five class meetings each week. Mr. Kibler.

A course complementary to Economics 618, with special emphasis on local public utilities, including water, gas, electric light and power, telephone and telegraph, etc. The history and present status of regulation and the leading problems arising therefrom, including supervision of holding companies, valuation, reasonableness of rates, adequacy and economy of service, etc. Public ownership versus public regulation.

656. The Distribution of Wealth and Income. Three credit hours. Spring Quarter. Three class meetings each week. Mr. Hayes.

Analyses of the process by which wages, interest, rent, and profit are determined; proposals for altering same.

658-659. Population. Three credit hours. Two Quarters. 658, Autumn; 659, Winter. Three class meetings each week. Given in alternate years. Mr. Wolfe, Mr. Harrison.

The growth and distribution of population. The relation of numbers to resources, productive capacity, standard of living, prosperity, and international economic problems. The dynamic aspects of population in relation to material and moral progress. Critical consideration of population theories and policies.

664-665-666. International Economic Problems. Three credit hours. Three Quarters. 664, Autumn; 665, Winter; 666, Spring. Prerequisite, Economics 401-402. Mr. James.

A critical review of international trade theories; comparative real costs vs. opportunity cases; foreign exchange rates and adjustments in the international balance of payments under various conditions (664). The United States and other selected countries as related to the world economy; balance of payments relationships and problems; trade and service transactions; capital movements; varying role of gold; monopolistic allocation of markets and dumping (665). International economic policy of the United States and selected countries; free trade vs. protection; tariffs, import quotas, exchange controls, and clearing agreements; trade agreements and stabilization funds; dislocations of war and reconstruction of world trade (666).

Not open to students who have credit for Economics 634, 635, or 651.

669. Socialism and Related Movements. Three credit hours. Autumn Quarter. Three class meetings each week. Mr. Hayes.

The developments of capitalism and protest movements related thereto such as utopian socialism, Marxism socialism, anarchism, syndicalism, and state socialism. Comparison of proposed schemes with capitalism in respect to the determination of the lines of production to be followed, the maintenance of full employment, the encouragement of progress, and the distribution of income.

671. Contemporary Economic Systems. Three credit hours. Winter Quarter. Three class meetings each week. Mr. Hayes.

The economic aspects of collectivism in Russia and economic developments in Great Britain and other countries. Comparisons with capitalism in the United States.

673. Principles of Social Economy. Three credit hours. Winter Quarter. Three class meetings each week. General prerequisites must include ten hours of economics and ten hours of history, philosophy, political science, psychology, sociology or geography; or thirty hours in any combination of the subjects listed. Mr. Wolfe.

The intent of this course is to arrive at some insight into the meaning and criteria of ideal economy, not in its material and technological, but in its fundamental human aspects. Purposive economics in relation to fundamental human values. Fundamental values and instrumental values. The means-end relation and the principle of economy of means. Income as opportunity, and the economic criteria of distribution of opportunity. The conflict between efficiency, liberty, and the ideal use of resources, material and human. Democracy and authoritarianism in relation to economy. An economic interpretation of social conflict and social ethics.

679. Economic Problems of Postwar Europe. Three credit hours. Winter Quarter. Three class meetings each week. Mr. Salz.

Economic problems of postwar Europe with special consideration to Germany.

681. Collective Bargaining Procedures. Two credit hours. Autumn Quarter. One class meeting each week. General prerequisites must include Economics 637 or the equivalent and permission of the instructor. Miss Herbst, Mr. Jucius.

A course designed to acquaint the student with the meaning, process, principles and organization of collective bargaining in the area of labor relations. Methods used to effect workable agreements will form the basis of study and discussion.

Not open to students who have credit for Economics 504.

682. **Mediation and Arbitration.** Two credit hours. Spring Quarter. One class meeting each week. General prerequisites must include Economics 637 or the equivalent and permission of the instructor. Miss Herbst.

Major economic problems in the adjustment of labor disputes. The techniques of mediation. Agencies for effecting mediation. The relative interests and responsibilities of workers, employers and the public will form the basis of study and discussion.

Not open to students who have credit for Economics 505.

710-711-712. **Statistical Analysis.** Two credit hours. Three Quarters. 710, Autumn; 711, Winter; 712, Spring. General prerequisites must include four credit hours of statistics and permission of the instructor. Mr. Smart.

Analysis of frequency distributions, correlation and the analysis of variance. Sampling, the design of statistical inquiries and tests of significance as well as the control of the quality of product from the statistical point of view will be emphasized. The use of tabulating and mechanical equipment in handling statistical problems will be treated.

716-717-718. **Public Control of Economic Processes.** Two credit hours. Three Quarters. 716, Autumn; 717, Winter; 718, Spring. Mr. Kibler.

The transition from laissez-faire to governmental, economic control with emphasis on the changed conditions which have rendered competition either ineffective or inadvisable as a regulator of certain phases of the economy in the public interest. The course includes analyses and appraisals of theories, policies, and control measures instituted by the United States and other selected countries.

725. **Production Economics.** Five credit hours. Autumn Quarter. Five class meetings each week. Prerequisite, Economics 401-402 or 403-404. Mr. Rowntree.

A study of input-output relationships as experienced in industry and agriculture; the application of business and economic analyses to these relationships; the least cost combination and the optimum size of production units; costs and returns.

799. **Special Problems in Economics.** One to three credit hours in any Quarter, with a maximum total of five credit hours. Any Quarter. General prerequisites must include satisfactory advanced courses in economics and related fields. All instructors.

Individual study in some field of economic interest under the direction of the appropriate member of the staff.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

These prerequisites must include good foundation courses of collegiate grade in the principles of economics, political science, psychology, European and American history.

801-802-803. **History of Economic Thought.** Three credit hours. Three Quarters. 801, Autumn; 802, Winter; 803, Spring. Three class meetings each week. Mr. Patton.

An account of the development of economic ideas and principles in the Western World with the purpose of showing how they were the outgrowth of the economic and political conditions of the times in which they originated.

804-805-806. **Economic History of the United States.** Three credit hours. Three Quarters. 804, Autumn; 805, Winter; 806, Spring. Three class meetings each week. Alternates with Economics 812-813-814. Mr. Smart.

*812-*813-*814. **The Economic History of Western Europe.** Two credit hours. Three Quarters. 812, Autumn; 813, Winter; 814, Spring. Two class meetings each week. Preferably preceded or accompanied by Economics 801-802-803. Alternates with Economics 804-805-806. Mr. Smart.

A general survey from the fall of the Roman Empire to the Great War. Especial attention is given to the interrelations between the economic institutions, the general culture, and the economic thought of the various periods. The development of modern capitalism. Economic background and social consequences of the Industrial Revolution. The economic causes and implications of modern European nationalism.

* Not given in 1946-1947.

*816-*817-*818. Modern Economic Theories and Theorists. Three credit hours. Three Quarters. 816, Autumn; 817, Winter; 818, Spring. Three class meetings each week. Alternates with Economics 871-872-873. Mr. Wolfe.

Critical consideration of the leading economists from J. S. Mill to the present. English and American classical and neo-classical writings, the Austrian School, and the more important continental theorists, including post-war and contemporary writers, both orthodox and unorthodox

*825. Current Taxation Problems. Two credit hours. Winter Quarter.

A critical analysis of the taxation problems now before the federal, state, and local governments.

863. Advanced Money. Three credit hours. Spring Quarter. Preferably preceded by a course in money and banking. Mr. Dice.

A study of the gold standard; the gold exchange standard; the role of money in the economic organization; the leading types of monetary theory; and the methods of stabilizing the price level.

864. Advanced Banking. Three credit hours. Winter Quarter. Three discussion periods each week. General prerequisites must include a course in money and banking. Mr. Dice.

The integration of the financial institutions; the theories of bank deposits; the theories of the elasticity of bank currency; the discount policy and the interest rate of central banks; the effectiveness of the different methods of regulating credit and business activities.

871-872-873. Problems in Contemporary Economic Theory. Three credit hours. Three Quarters. 871, Autumn; 872, Winter; 873, Spring. Alternates with Economics 816-817-818. Mr. Wolfe.

(a) An examination of the assumptions and analytic techniques of current theoretical economics. Formal, empirical, and normative economics. Statics and dynamics. (b) Empirical techniques. (c) The aims, methods, and content of institutional economics. The relations among logic, ethics, law, history, psychology, and economics.

874. Labor and Industry. Two credit hours. Spring Quarter. Miss Herbst.

A seminar course on present-day problems confronting the wage-earner. The problems will be considered with special reference to the Trade Union Movement in this and other countries.

875-876. Problems of Capital Accumulation and Utilization. Three credit hours. Two Quarters. 875, Winter; 876, Spring. Three class meetings each week. Given in alternate years. Mr. Wolfe.

An analysis of the doctrines of economists and other writers concerning the problems of capital accumulation and utilization with especial attention to economic "progress," oversaving, thrift, industrial depressions, inequality of wealth, and the export of capital.

877. Social Insurance Problems. Two credit hours. Winter Quarter. Mr. Bowers.

A critical analysis of social insurance problems faced by the Federal and State governments: the place of social insurance in the economic system, with special reference to its preventive aspects and stabilizing possibilities; economic aspects of administration.

*878. Mathematical Economic Theory. Three credit hours. Autumn Quarter. Given in alternate years. Mr. Bittermann.

885-886-887. Philosophical Foundations of Economics. Three credit hours. Three Quarters. 885, Autumn; 886, Winter; 887, Spring. Given in alternate years. Mr. Salz.

Philosophical and methodological foundations of economics. Analysis of the conception of Geisteswissenschaften. Fundamental assumptions. The problem of values. The relation of social to natural sciences. The development of Geisteswissenschaften in Europe. Controversial questions

888-889-890. Current Economic Literature. One credit hour. Autumn, Winter, and Spring Quarters. Mr. Wolfe, Mr. Hayes, Mr. Salz.

A seminar course surveying and analyzing the contributions of the technical journals during the year. Reading assignments according to the student's interest and field of specialization, conferences, reports and criticisms.

* Not given in 1946-1947.

950. Research in Economics. Autumn, Winter, and Spring Quarters. Open by permission of the Committee on Graduate Work.

Qualified graduate students who wish to do research with the advice of members of the staff of the Department of Economics may register for this course.

EDUCATION

Office, 120 Arps Hall

PROFESSORS EIKENBERRY, ALBERTY, ANDERSON, BODE (EMERITUS), CAHOON, ECKELBERRY, FAWCETT, GOOD, HECK, HULLFISH, KLEIN (EMERITUS), LANDSITTEL, LEWIS, RATHS, REEDER, SANDERSON, SEELY, SMITH, STONE, STREITZ, THARP, WARNER AND ZIRBES, ASSOCIATE PROFESSORS BENNETT, BURR, EBERHART, TYLER, HARDING, GRIFFIN, KIRCHER AND MENDENHALL, ASSISTANT PROFESSOR HAWS, MR. HUNT, MR. JACOBS, MISS WELLS

Departmental Committee on Graduate Work: A committee, including the Chairman of the department, is in charge of the graduate work of the Department.

Prerequisites for Graduate Work: 1. A student seeking to enter upon graduate work in the field of education shall hold a Bachelor's degree from an accredited institution of higher learning, and, (by official records or comprehensive examinations) shall show familiarity with certain areas of education to the extent that is required for appropriate standard certification to teach in the public schools of Ohio or another state having comparable standards. The areas in which familiarity should be exhibited ordinarily shall include the following: (a) Philosophy or Principles of Education; (b) History of Education; (c) Educational Psychology; (d) Methods of Teaching; (e) School Organization and Management. This does not necessarily mean that courses shall have been taken which bear titles corresponding exactly to the fields named above. In addition to the above requirement the student will present course credits for student teaching or provide evidence of one or more years of successful teaching experience.

2. Specific requirements to supplement the foregoing general prerequisites may be set in the various areas of specialization within the Department.

3. In cases which are exceptional by reason of the maturity, training, and experience of the student concerned, these prerequisites may be modified by the department, subject in each case, to the approval of the Dean of the Graduate School.

Areas of Specialization Within the Department: The following are the areas in which students may specialize for the degrees of Master of Arts or Doctor of Philosophy:

1. *For the Master's Degree:* Elementary education, secondary education, teaching one or more of the secondary school subjects or fields, superintendence, philosophy of education, industrial arts, industrial vocational education, history of education and/or comparative education, special education, guidance and personnel, adult education, and business education.

2. *For the Ph.D. Degree*: Each of the areas named above and in addition, higher education, college teaching of education, evaluation, and the curriculum.

The departmental committee on graduate work, in cooperation with advisory committees, may arrange in specific cases, on either the Master's or Doctor's level, for specializations not listed above, subject to the approval of the Dean of the Graduate School in each instance.

Requirements for the Master's Degree: 1. *Course Requirements.* The minimum forty-five hours of graduate work for the degree must be selected in accordance with certain regulations of the Department. Copies of these regulations may be obtained at the departmental office.

2. *Requirement in Written English.* Each candidate is required to demonstrate ability to write clear and correct English.

3. *Examination Requirements.* Each candidate must take: (a) A diagnostic test covering areas of general professional competence; this will be given near the beginning of his graduate work for the purpose of guidance; (b) a written examination in his area of specialization, to be conducted by his adviser and at least one other member nominated by his adviser and approved by the committee on graduate work in education; (c) an oral defense of his thesis before a committee consisting of his adviser and at least one other staff member nominated by his adviser and approved by the departmental committee on graduate work.

4. *Bases of Recommendation for the Degree.* In making its recommendation concerning the granting of the Master's degree to any student, the examining committee considers his record in course work, his showing on examination, the reports of professors in whose classes he has been enrolled, the quality of his thesis, and any other available data. The Department reserves the right to withhold recommendation for the degree in cases involving moral delinquency, serious mental or emotional instability, active communicable disease of a serious character, or any other physical or mental condition which would render clearly undesirable the student's attempting to enter professional educational work.

Requirements for the Ph.D. Degree: 1. *Direction of the student's work for the doctorate.* At the beginning of a student's work for the doctorate a member of the staff is designated by

the committee on graduate work in education as his tentative or temporary adviser. On nomination of the tentative adviser, an advisory committee for the student, consisting of a chairman and at least two other staff members, is appointed. It has the general direction of the student's work.

2. *The foreign-language requirement.* The student's advisory committee designates the method by which the student will meet the foreign language requirement.

3. *The departmental preliminary and the general examinations.* The departmental examination is conducted by the student's advisory committee. It consists of a written portion to be followed, at the option of the committee, by an oral portion. The written portion covers the areas designated by the advisory committee. The examination may be taken in any Quarter the student desires, providing that his advisory committee certifies that in its opinion he is prepared to take it. A "satisfactory" report on the examination indicates that in the opinion of the committee the student is prepared to take the general examination for admission to candidacy (provided also that he has satisfied the foreign language requirement of the Graduate School).

The general examination for admission to candidacy consists of a written and oral portion. The written portion covers the area or areas designated by the student's Advisory committee, and requires from six to ten hours. The examination may be taken during any Quarter the student desires, provided he is registered in the Graduate School, has satisfied the foreign language requirement, and has passed the departmental preliminary examination. The general examination is conducted by a committee appointed by the Dean of the Graduate School on nomination of the student's advisory committee. The examining committee ordinarily includes the members of the student's advisory committee.

The areas to be covered by the departmental preliminary and the general examinations and the weight to be given to each area are designated by the student's advisory committee. Not fewer than three nor more than six areas are designated for the two examinations. Of the areas designated, no fewer than three, including those covered in the general examination, are chosen from the areas listed above as suitable for specialization for the doctorate; the others may be within or without the Department of Education. The total number of hours of written examination is not less than twenty. No area designated is given a weight of more than fifty per cent of the total of the two examinations.

In deciding whether a student is to be recommended for admission to candidacy, the committee considers the same types of evidence as for recommendation for the Master's degree. The Department reserves the right to withhold recommendation for admission to candidacy (or for the degree) for the reasons mentioned above in connection with the Master's degree.

4. *Requirement in written English.* Each candidate is required to demonstrate ability to write clear and correct English.

5. *The dissertation.* The dissertation topic is selected by the student with the approval of the student's advisory committee. The members of this committee ordinarily constitute the committee appointed by the Dean of the Graduate School to evaluate the dissertation.

6. *The final oral examination.* The members of the committee to conduct the final oral examination are nominated to the Dean of the Graduate School by the student's advisory committee; ordinarily, this committee includes the members of the advisory committee.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

GENERAL AND BASIC

600. Minor Problems. One to four credit hours. Autumn, Winter, and Spring Quarters. Students may, with the approval of their advisers, register for more than one section of Education 600 or for the same section two or more times.

By permission of the Chairman of the Department and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under members of the Bureau staff.

(a) Business Education.
(d) Elementary Education. Miss Zirbes, Miss Streitz, Mr. Burr, Mr. Harding.
(c) Guidance. Mr. Smith, Mr. Anderson, Mr. Heck, Mr. Bennett, Mr. Mooney.
(e) Higher Education. Mr. Anderson, Mr. Hullfish, Mr. Raths.
(f) History of Education and Comparative Education. Mr. Good, Mr. Eckelberry.
(g) Industrial Arts Education. Mr. Smith, Mr. Haws.
(h) Industrial-Vocational Education. Mr. Stone, Mr. Smith.
(i) Philosophy of Education. Mr. Hullfish, Mr. Kircher.
(j) Radio Education. Mr. Tyler.
(k) Secondary Education. Mr. Alberty, Mr. Eikenberry, Mr. Eckelberry.
(l) Special and Adult Education. Mr. Heck, Mr. Nisonger, Miss Rosebrook, Miss Sanderson.

(m) Superintendency. Mr. Lewis, Mr. Reeder, Mr. Heck, Mr. Bennett.
(n) Teaching of English. Mr. Seely, Mr. Eberhart.
(o) Teaching of Foreign Languages. Mr. Tharp.
(p) Teaching of Mathematics. Mr. Fawcett.
(q) Teaching of Sciences. Mr. Cahoon, Mr. Haub.
(r) Teaching of Social Studies. Mr. Landsittel, Mr. Griffin, Mr. Hunt.
(s) Visual Education. Mr. Dale.

601. Radio in Education. Three credit hours. Winter Quarter. Mr. Tyler.

Radio's role in education in and out of school, including planning and preparation of programs, use of programs and evaluation. Opportunities for observation and individual problems.

602. Visual Instruction. Three credit hours. Winter Quarter. Mr. Dale.

A consideration of the role of visual instruction in education; intensive study of the contribution of visual materials to educational objectives with especial attention to the research literature. Educational principles to be followed in the utilization of visual materials will be analyzed. Standards for evaluation will be critically examined.

790. An Overview of Education. Three credit hours. Autumn Quarter. Open only to teachers of experience. Mr. Mendenhall and staff of the Department of Education.

A consideration of major problems and issues in education today, an overview of the contributions of representative fields of learning to the general education of students, and an inquiry into the types of elementary, secondary, and teacher-education programs necessitated by the times in which we live. The course consists of a series of lectures, discussions, and demonstrations under the direction of specialists in the College of Education, together with related investigations carried on by the student.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46, also on page 114.

802. Research Methods and Thesis Preparation. Three credit hours. Winter Quarter. Mr. Reeder.

Emphasizes methods of research with special attention to the preparation of theses. The following topics, among others, are treated: types of research; criteria for selecting and planning the problem; preparing the working and the final bibliographies; the securing of data for various types of research; the organization, presentation, and interpretation of material; the form of citations; and the preparation of statistical tables and pictorial illustrations.

***804. Educational Experimentation.** Five credit hours. Autumn and Spring Quarters. One two and one-half class hour meeting and one laboratory period of two hours each week to be arranged. Mr. Raths.

A consideration of significant aspects of the changing educational situation with particular reference to their implications for research. Methods of investigation and techniques of experimentation applicable to the evaluation of current trends in elementary, secondary and higher education.

WORKSHOP

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

625. Field Laboratory Workshop. Three credit hours. Autumn, Winter, Spring Quarters. May be taken for not more than three Quarters with a maximum credit of nine hours. ‡One two-hour workshop meeting each week in addition to individual conferences and supervised experimentation. Conferences, observations, and committee reports. Workshops will be conducted in the schools or school centers for which workshops are authorized. Open to teachers, administrators, and supervisors with junior standing or above, who, in the judgment of the committee on workshops, have an educational background in the subject matter of the workshop which will serve as an adequate base for intensive work in this field. Such persons must have the recommendation of the

* Not given in 1946-1947.

school system or systems in which the workshop is conducted, as well as that of the college staff member directing the workshop.

Graduate students must demonstrate satisfactory ability to deal critically and constructively with a phase of the total problem approved by the workshop director as appropriate for graduate study, and must submit individual papers covering in detail their contribution to the total workshop problem.

Application for a Field Laboratory Workshop should be made to the Chairman of the Department of Education at least one month prior to the opening of the Quarter in which it is desired to conduct the workshop. Each workshop will be concerned with a problem arising in a local school system in Ohio, the solution of which has educational significance also to other school systems in the state or nation. In the attack on such problems, individual members of the workshop will study and experiment with respect to their special fields as they relate to the total problem. Students registered for the course will be required to submit individual papers covering in detail their contributions to the total workshop problem. Graduate students must demonstrate satisfactory ability to deal critically and constructively with a phase of the total problem approved by he workshop director as appropriate for graduate study. The workshop group will be required to prepare, under the supervision of the workshop director, a written report which includes a statement of the problem attacked, the procedures used, the results obtained, and such other information as may be useful in dealing with a similar problem in other countries.

†626. **Education Workshop.** Eight credit hours for six-week workshops, four credit hours for three-week workshop. Maximum credit twelve hours.* Full time of students required, therefore registrants not permitted to take other University work concurrently. Open only to experienced teachers, administrators, and supervisors with junior standing or above who, in the judgment of the committee on workshops, have an educational background in the subject matter of the workshop which will serve as an adequate base for intensive work in this field.

Graduate students must demonstrate satisfactory ability to deal critically and constructively with a phase of the total problem approved by the workshop director as appropriate for graduate study and must submit individual papers covering in detail their contribution to the total workshop problem.

Education workshops will be arranged upon application of twenty enrollees, provided appropriate faculty staffing is available.

The Education Workshop brings together from a variety of schools persons of similar or closely related specialized interests. In the Workshop they will pool their practical experience and the results of their local experimentation and will systematize and relate this knowledge through intensive study of the literature of the field. The primary purpose will be that of developing sound principles and procedures with respect to professional work in the specific field.

PHILOSOPHY OF EDUCATION

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

607. Philosophy of Education. Three credit hours. One Quarter. Autumn, Winter, Spring. Open by permission of the instructor. Mr. Hullfish, Mr. Kircher.

A consideration of the distinctive function or purpose of education in the social order and the bearing of this purpose on problems of organization and administration, the selection of subject matter, and classroom procedures.

610. Conceptions of Mind in Educational Theory. Three credit hours. Autumn Quarter. Mr. Hullfish.

A study of the doctrines of mind that have exercised a determining influence upon educational theory and practice.

611. The Thinking Process in Its Educational Bearings. Three credit hours. Spring Quarter. Mr. Hullfish.

A study of the thinking process for the purpose of tracing its implications for educational theory and classroom practice.

† Not given during the academic year, 1946-1947.

617. Modern Tendencies in Educational Philosophy. Three credit hours. Winter Quarter. Mr. Kircher.

A discussion of current educational doctrines and controversies, in the light of their historic background and their philosophical implications.

620. Moral Ideals in Education. Three credit hours. Spring Quarter. Mr. Kircher.

A consideration of types of moral ideals, of the relation of moral values to school subjects, and of the question of direct and systematic moral instruction in the schools.

624. Social Education. Three credit hours. Spring Quarter. Lectures and discussions. Mrs. Robbins.

Case studies of community schools; school uses of community resources in curriculum and public interpretation; problems in adapting school to community; the teacher's community contacts.

HISTORY OF EDUCATION AND COMPARATIVE EDUCATION

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

632. The History of Modern Education. Five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Good, Mr. Eckelberry.

Not open to students who have credit for Education 507.

635. The Evolution of Educational Thought. Five credit hours. Spring Quarter. Given in alternate years. Mr. Good.

A study from the sources of the great philosophies of education in relation to their times; and an evaluation of their influence on present educational thought and practice. The thought of the Greek, Roman, Renaissance, and the modern democratic and industrial thinkers will be studied.

***636. Evolution of American Education.** Five credit hours. General preberry.

After a brief survey of the colonial beginnings, emphasis will be laid upon the early national period, the expansion after the Civil War, and the reconstruction of American education since 1900. Study of original sources. The evolution of elementary, secondary, and higher education.

***638. Comparative Education.** Three credit hours. Mr. Good, Mr. Eckelberry.

This course provides a general introduction to the comparative study of education. It will include the study of schools and other educational agencies in several selected countries, including the United States, and their relations to the social and political institutions of the countries involved. Typical subjects will be: educational organization, the extent of educational opportunity, curricula, methods of teaching, measures to promote child welfare in and out of school, and the relation of these to the total culture of the countries studies.

639. Great Teachers. Two credit hours. Winter Quarter. Two one-hour lectures each week. Mr. Good.

Study of the times, personalities, and work of several eminent teachers: Socrates, Plato, Jesus, Quintilian, Agassiz, Arnold and others.

†640. Foreign Educational Systems. Three credit hours. Spring Quarter. Mr. Good, Mr. Eckelberry.

The educational system and culture of a foreign country or those of a group of related countries will be studied intensively as an aid to international understanding and in preparation for educational service at home and abroad. Educational organization and education as a factor in public policy will be emphasized. The countries or regions to be studied will be varied from Quarter to Quarter.

641. The History and Theory of Vocational Education. Three credit hours. Autumn Quarter. One two-hour meeting each week. Given in alternate years. Mr. Stone and others.

The history and theory of activities related to agriculture, business, industry, and home making as a part of education, and their relation to the general theory and practice of education.

* Not given in 1946-1947.

† Not given during the academic year, 1946-1947.

642. History of Physical and Health Education. Three credit hours. Spring Quarter. Mr. Daniels.

An historical survey of physical and health education beginning with the physical education of ancient Greece, with special emphasis on recent and contemporary developments in Europe and America.

ELEMENTARY EDUCATION
FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

651. Foundations of Elementary Education. Three credit hours. Autumn Quarter. Miss Streitz.

Utilization of research in the basic sciences in developing the background for an understanding of present trends in elementary education. Critical examination of current theories. Consideration of dynamic child purposes, pupil-teacher planning, and cooperation between home, school, and community.

652. The Changing American Elementary School. Three credit hours. Winter Quarter. Miss Zirbes.

Consideration of the effects of rising educational and professional standards on the functions of the elementary school and the teacher. Ways and means of stimulating in-service growth in professional judgment and techniques. Practical approaches to typical problems and situations involving the improvement of instruction.

653. Organization of the Elementary School. Three credit hours. Winter Quarter. Mr. Harding.

Analysis of types of elementary school organization; influence upon the educational programs. Application of research findings to selection and use of materials of instruction, logical and psychological organization of subject matter, educative activities, standards of achievement. Special consideration given students' professional problems, needs, and interests.

654. The Teaching of Arithmetic in the Elementary Schools. Three credit hours. Autumn Quarter. Mr. Harding.

An inquiry into methods of teaching arithmetic in the first six grades, the principles upon which they are based, and the influence of scientific studies upon the course of study and methods. Examination of subject matter and materials with emphasis upon mathematical thinking.

Not open to students who are pursuing the curriculum for elementary teachers except by special permission of the departmental adviser.

Not open to students who have credit for Education 510.

655. Industrial Arts for Teachers in Elementary Schools. Three credit hours. One Quarter. Autumn, Winter, Spring. Mr. Haws.

First-hand study of typical modern industries as one means of developing understanding and insight into social and economic backgrounds and their implications. Criterion characterization of industrial arts in the program of elementary education. Selection, study, and development of many typical problems with reference to the various levels of the elementary school, in addition to planning the physical setting required.

†656. Language and Reading in the Elementary School. Three credit hours.

A consideration of modern trends in the teaching of reading, study habits, oral language, composition, writing, and spelling involving a study of the practical bearings of investigation and progressive theory on the improvement of current practice in the teaching of all phases of English in the elementary school. The organization and administration of functional language arts program.

Not open to students who are pursuing the curriculum for elementary teachers except by special permission of the departmental adviser.

Not open to students who have credit for Education 511.

657. Teaching the Social Studies in the Elementary School. Three credit hours. Winter Quarter. Mr. Burr.

This course considers the educational values of the social studies, reasons for, and ways and means of integrating history, geography, and civics, and the development of pupils of

† Not given during the academic year, 1946-1947.

appropriate emotional and thought reactions to social problems and issues. Opportunity is afforded for observation in the University Elementary School.

Not open to students who are pursuing the curriculum for elementary teachers except by special permission of the departmental adviser.

Not open to students who have credit for Education 512.

†658. **Direction and Supervision of Elementary Teacher Education.** Three credit hours. Spring Quarter. Miss Zirbes.

An intensive study of the problems confronting the director of student teaching, the supervisors of student teachers and critic teachers. Special attention is given to the development of the teacher as a person, enriched content courses, reorganization of methods courses, have intimate relation of theory and practice, widening the scope of student teaching, and creative supervision of student teaching.

661. **Problems of Elementary Teachers in Service.** Two credit hours. Autumn Quarter. Participation in special projects and investigations with reports. Open to graduate students by permission of the instructor and to principals and teachers in service.

The work will center about ways and means of improving instruction through actual attack on selected classroom problems.

662. **Laboratory Problems in Child Development.** Three credit hours. Spring Quarter. General prerequisites must include Education 651-652. Miss Zirbes.

Workshop in Elementary Education. Registration in the course is restricted to students with professional experience and is subject to instructor's approval.

664. **Health Education for Teachers.** Three credit hours. Spring Quarter. Three lecture periods each week. Mr. Oberteuffer.

A consideration of the teacher's responsibility for practicing and maintaining high standards of personal hygiene and health, and a first-hand study of the environmental and social conditions and problems of community health.

704. **Laboratory Study of the Ohio State University School.** Two to five credit hours. Autumn Quarter. Mr. Gilchrist and staff.

A graduate course in which elementary and secondary school teachers, principals, supervisors, and superintendents will study the University School in action with the advantages of planned guidance and interpretation, contacts, and conferences with the staff. In addition to the general problems of the course there will be opportunities for students to select individual topics for special study, and to consider the bearings of educational transition on their own work in the field.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46, also on page 114.

824. **The Elementary School Curriculum.** Three credit hours. Autumn Quarter. Miss Streitz.

A critical study of the reorganization, construction, and administration of the elementary school curriculum in the light of modern educational principles and objectives, the data contributed by research and the best current practices found throughout the country. Special attention will be given to organization of staff for curriculum study, to the basic issues in realizing a sound curriculum and to the installation, adaptation and administration of the revised curriculum.

825. **Elementary School Administration and Supervision** Three credit hours. Winter Quarter. Miss Streitz.

A critical analysis of current practice in the organization, administration and supervision of the elementary school. Formulation of guiding principles and effective program, practical implications of creative democratic leadership in efficient management, in the diagnosis of teaching, in the professional development of personnel, in the creative use of school and community activities, and in the broader public and professional relations of the school.

† Not given during the academic year, 1946-1947.

826. Practice in Supervision. Three credit hours. Spring Quarter. Open only by permission of the instructor. Miss Zirbes.

Typical school problems will be used to provide practice in the techniques of supervisory service. Emphasis will be placed on the application of principles of supervision to actual classroom situations.

SECONDARY EDUCATION

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

670. Teaching Literature in the High School. Five credit hours. One Quarter. Autumn, Winter, Spring. Five lectures each week: observations. Mr. Seely.

Emphasis will fall upon the selection of suitable poetry, drama, prose-fiction, etc., for junior and senior high-school pupils; developing methods for their presentation and study; and suggesting means for correlating the work in literature with the other high-school studies.

671. Teaching Composition in High School. Five credit hours. One Quarter. Autumn, Winter, Spring. Five lectures each week: observations. Mr. Seely.

This course will be devoted to the discussion of the methods of teaching grammar and composition, and to means of developing originality, imagination, and individuality in the oral and written expression of high-school pupils.

***672. Teaching Composition in High School.** Three credit hours. Lectures, conferences, readings. This course is the more advanced part of Education 671 (offered during the year). It may be elected by teachers and other persons of maturity who are not required to elect all of Education 671. (Students who will do practice teaching in English may not elect this course since they will elect Education 671 during the Autumn or Spring Quarter.) Mr. Seely.

This course will be devoted to the materials and methods of teaching the language fundamentals, oral composition, and written composition.

†674. The Supervision of Journalism in Secondary Schools. Three credit hours.

This course is designed for persons who have been teaching journalism in secondary schools, or who act as faculty advisers for school newspapers, magazines, or annuals. It includes a general survey of the editorial, publishing, and mechanical phases of school newspapers and other publications with emphasis on those aspects which are of particular value to teachers.

Open to students registered in the College of Education and to graduate students.

Not open to students who have credit for Education 546.

675. The Teaching of Speech. Five credit hours. One Quarter. Autumn and Winter. General prerequisites must include a course in theory and practices in secondary school teaching and twenty hours in speech. Miss Sanderson.

This course is designed for prospective teachers of speech in junior and senior high schools. It includes a study of the purposes and procedures used in teaching public speaking in secondary schools; consideration of the place and potentialities of educational dramatics and out-of-class school plays. Emphasis is placed upon the auditory aids and available materials. The speech teacher's responsibility for the establishment and management of speech clinics is considered.

Necessary classroom, school, and library equipment for the teaching of speech and evaluation of texts in speech receive attention.

676. Teaching in the Core Program in the Secondary School. Three credit hours. Spring Quarter. Mr. Alberty and others.

A course for prospective teachers and teachers in service who are interested in learning how to work effectively in schools which utilize the core curriculum type of organization. A critical study will be made of current practices in the field through analysis of existing curricula and procedures and through observations of and participation in the core program of the University School. Careful consideration will be given to the techniques of selecting and organizing course materials and to the cooperative planning of units of work. The group will undertake building at least one resource unit.

* Not given in 1946-1947.

† Not given during the academic year, 1946-1947.

677. The Teaching of the Social Studies I. Five credit hours. One Quarter. Autumn and Spring. Five lectures each week; observations. General prerequisites must include twenty hours in the social studies and a course in theory and practices in secondary school teaching or equivalent. Mr. Griffin.

An examination of different theories of the role of social studies materials within the learning process, with particular attention to the impact upon the beliefs, attitudes, and values of secondary school students. Illustrative materials will be drawn primarily from history, economics, and sociology, with some attention to geography, anthropology, and political science. Special emphasis is given to the use of social studies materials in clarifying the contrast between authoritarianism and democracy, to the function of information within the reflective process, and to the possible contributions of the social studies teacher within the core curriculum.

678. The Teaching of the Social Studies II. Three credit hours. One Quarter. Autumn and Spring. Lectures, discussions, observations. General prerequisites must include twenty hours in the social studies and a course in theory and practices in secondary school teaching or equivalent. Mr. Griffin.

A continuation of Education 677. The purpose of the course is further to exemplify concretely the principles developed in Education 677, and to help the student to develop enriching materials specifically related to the class or classes he is teaching. Self-directing group work under proper leadership is the type of classroom procedure throughout. Observation of teaching in secondary schools is involved.

680. Science Materials for Junior and Senior High Schools. Three credit hours. Winter Quarter. Lectures, readings, problem assignments and participation in the University School science classes. General prerequisites must include a major or minor in science and Education 684, or the equivalent. Mr. Cahoon and science staff of the University School.

Planned to give teachers of junior and senior high school science contact with important teaching materials and sources. Emphasis will be placed upon such topics as planning and use of materials, key sources, visual and audio aids, materials for teaching scientific thinking and tests and evaluation instruments. Students will be expected to collect, construct and organize materials for use in their own science classes.

Not open to students who have credit for Education 538.

681. Laboratory Practicum for Teachers of Science. Two to five credit hours. Winter Quarter. Demonstrations, laboratory work, construction of apparatus, participation in science classes in the University School. General prerequisites must include Education 683 or 684 or equivalent, and major or minor in one or more of the following: physics, chemistry, physics-chemistry, general science, biology. Mr. Cahoon and the science staff of the University School.

Students will have experience in working with such techniques as glass blowing, wood and metal working, chemical techniques, electrical circuits and devices, and photographic and visual aids as related to apparatus materials and tools used in science courses in secondary and elementary schools. Students will make use of these techniques in assembling and constructing demonstration and laboratory apparatus for use in various science courses. Techniques and projects will be adapted to the needs and interests of individual students or teachers.

Education 681 may be taken more than once provided the total credit received for Education 681 and 539 does not exceed five Quarter hours.

†682. Field Laboratory in Conservation Education. Six to eight credit hours. General prerequisites must include twenty hours in Education, including Education 684 or equivalent.

Primarily designed for teachers in elementary and secondary schools and is conducted from Tar Hollow Camp near Chillicothe, Ohio. It will employ the entire time of the student. Field observations, laboratory demonstration, group discussions and lectures concerning curriculum and methods of teaching in the fields of conservation of soils, wild life, and other resources. will be conducted.

683. The Teaching of Biology. Three credit hours. Spring Quarter. Three recitations each week: observations. Mr. Haub, Mr. Taft.

The work will include lectures and demonstrations by the students of the best methods of presenting botany, zoology, and biology to high school students.

† Not given during the academic year, 1946-1947.

684. The Teaching of General and Physical Science. Three credit hours. Autumn Quarter. Lectures, reading, observations and participation in the University School science classes. Mr. Cahoon and science staff of University School.

A study of the problems and techniques in the teaching of general and physical science courses in junior and senior high schools. Objectives, planning, use of demonstrations and laboratory experiments, texts and reference materials, pupil projects, trips, teaching and evaluating scientific thinking, directed study, visual aids, professional literature.

686. The Curriculum in Schools of Nursing. Three credit hours. Winter Quarter. Miss McKenna.

Consideration is given to the philosophy and purpose of the curriculum for Schools of Nursing as set forth in *A Curriculum Guide for Schools of Nursing.*

A study of the interrelation between theory and practice; length and placement of courses; problems pertaining to the planning of the class schedule in the light of given known situations; responsibilities of teaching personnel; class load and physical facilities, such as classrooms, laboratories and library.

687. The Teaching of Mathematics in Secondary Schools. Five credit hours. Autumn Quarter. Lectures, readings, observations and participation in the mathematics classes of the University School. Mr. Fawcett and the mathematics staff of the University School.

Lectures, readings and student investigations of individual problems together with participation in mathematics classes at the secondary level.

688. Mathematics Materials for Junior and Senior High Schools. Three credit hours. Winter Quarter. Lectures, problem assignments, readings, and participation in University School mathematics classes. General prerequisites must include twenty hours of mathematics and twenty hours in psychology and education. Education 687 must be included in the prerequisites or taken concurrently. Mr. Fawcett and mathematics staff of University School.

Planned to give teachers and prospective teachers of mathematics an enlarged concept of and first-hand experience with important materials and sources useful in providing worthwhile experience for pupils in secondary schools. Topics include the development and use of important concepts in mathematics, key sources of materials, tests, and evaluation instruments. Students will be expected to collect, construct and organize materials for use in their own mathematics classes.

Not open to students who have credit for Education 545.

689. Field and Laboratory Work for Teachers of Mathematics. Three credit hours. Spring Quarter. Demonstrations, field work, projects, readings, laboratory work and participation in University School mathematics classes. General prerequisites must include a major or minor in mathematics and Education 687 or the equivalent. Mr. Fawcett and mathematics staff of the University School.

Actual experience with instruments and apparatus in field and laboratory work suitable for boys and girls in the junior and senior high schools. The use of devices and apparatus including the slide rule, the plane table, the alidade, the transit, the angle mirror, the sextant, the hypsometer and clinometer for teaching concepts and skills needed in elementary surveying and mapping. Field and laboratory work and demonstrations will be carried out illustrative of teaching procedures applicable to secondary school classes.

Not open to students who have credit for Education 544.

***690. The Teaching of German.** Three credit hours. Winter Quarter. Three recitations each week: observations. Mr. Kramer.

Values. Critical study of objectives and methods. Textbook selection. Classroom procedures. Readings, discussions, and reports.

* Not given in 1946-1947.

692. Methods and Techniques of Teaching Romance Languages. Five or seven credit hours. Autumn Quarter. Five meetings each week, combined and sectional: observations. Mr. Tharp.

Lectures, readings, discussions and conferences.

Values. Objectives. Demonstration and lectures on methods of teaching reading, grammar and pronunciation. Textbook analysis. Professional advancement. Examinations and marking. Eight observations of high school classes required.

Sections. Techniques of instruction. The work of each section carries two hours of credit, and students may enroll in any sections for which they possess the prerequisites.

Section A. French. Mr. Tharp.

Section B. Spanish. Mr. Tharp.

Lesson plans. Problems of presentation in the reading lesson, grammar, pronunciation. Construction of teaching materials. Choice of course content. Evaluation of classroom procedures.

694. The Teaching of Latin. Three credit hours. Spring Quarter. Three recitations each week: observations. Mr. Hough.

Values. Teachers' equipment, objectives and methods. Classroom procedures. Lectures and assigned readings.

696. The Teaching of Mechanical Drawing I. Three credit hours. Autumn Quarter. Four two-hour laboratory periods each week: observations. Mr. Shupe.

Objectives and methods in teaching the language of graphics. Reading, visualizing and translating mechanical drawings. Freehand sketching and the use of instruments. Theory of shape description, orthographic and pictorial projection. Intersections and developments. Lettering.

697. The Teaching of Mechanical Drawing II. Three credit hours. Winter Quarter. Four two-hour laboratory periods each week: observations. General prerequisites must include Education 696. Mr. Shupe.

Size description. Working drawings. Lettering. Methods of graphic reproduction. Drawing room and office equipment. Planning a secondary school course: content, arrangement, methods of presentation, standards, examinations and grading.

698. The Teaching of Mechanical Drawing IIa. Three credit hours. Spring Quarter. Four two-hour laboratory periods each week. Observations. General prerequisites must include an elementary course in drawing. Mr. Philby.

A study of objectives and methods. Planning a secondary school course, content, arrangement, demonstration methods and equipment, design of problems, examinations and grading. Modeling. Blackboard technique. Graphic reproduction. Correlation with other subjects.

699. Student Activities in the Secondary School. Two credit hours. Spring Quarter.

The place of "extra-curricular" activities in the secondary school program. Consideration will be given to home-room activities, pupil participation in school government, assemblies, clubs, publications, debating and dramatics, athletics, honor societies, social activities, control of participation in activities, and financial administration of activities. Of special interest to high school teachers and high school principals.

703. The Role of the Secondary School in the Social Order. Three credit hours. Winter Quarter. Mr. Alberty.

An orientation course for teachers, principals, and superintendents which deals with conflicting basic philosophies of secondary education, historical backgrounds, present practices and trends. The relation of the secondary school to the immediate and wider community will be given consideration.

704. Laboratory Study of the Ohio State University School. (For description see page 120 under Elementary Education.)

705. Present-Day Trends in the Organization of Secondary Education. Three credit hours. Autumn Quarter. Mr. Eikenberry.

A critical examination of present-day trends in the organization of American secondary education. Consideration will be given to district organization, the junior college movement, special types and comprehensive schools, part-time, continuation, and evening schools, state and federal control, post-war problems of organization.

***706. Problems of the Supervising Teacher in Secondary School Science.** Four credit hours. Winter Quarter. Lectures, student reports, laboratory. General prerequisites must include teaching experience, Education 684, and permission of the instructor. Mr. Cahoon.

Planned for teachers who are working with student teachers in their classes, or who expect to work with student teachers, and for those concerned with the supervision of teacher training programs in the science area. Objectives, curricula, recent trends, planning "lessons" and pupil experiences, techniques, classroom management, sources of teaching aids, evaluation of teaching, professional literature.

707. The Evolving Secondary School Curriculum. Two credit hours. Winter Quarter. Mr. Alberty.

A basic course for teachers, principals, and superintendents, which deals with current theories and practices in curricula making in the light of historical backgrounds. Special emphasis is given to a study of the curricula of some of the leading public, private, and laboratory schools of the United States.

***708. Evaluation of Secondary Schools.** Three credit hours. Autumn Quarter. Lectures, reports, field studies.

A critical study of techniques of evaluating secondary schools with particular reference to the techniques developed by the Cooperative Study of Secondary School Standards and the Commission on the Relation of School and College of the Progressive Education Association.

Not open to students who have credit for Education 833.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46, also on page 114.

829. Supervision in the Secondary Schools. Three credit hours. Spring Quarter. General prerequisites must include Education 701 or 702 or 703 or 705. Mr. Alberty.

A study of the problems involved in the in-service training and improvement of teachers, improvement in learning, techniques of classroom visitation, teacher rating, teachers' meetings, teacher participation in policy and program making, and the like.

830. Administration of the Secondary School. Three credit hours. Spring Quarter. General prerequisites must include Education 701 or 702 or 703 or 705.

A critical study of the major problems and issues in the organization and administration of the secondary school. Of special interest to high school principals and county, exempted village, and city superintendents.

831. Workshop in Curriculum Development in Secondary Schools. Two to five credit hours. Spring Quarter. General prerequisites must include Education 707 or the equivalent. Mr. Alberty.

An advanced course in the techniques of curriculum construction and organization, oriented in terms of the actual problems which teachers and administrators face in revising actual programs. The course will be used primarily as a laboratory for the study of specific problems in curriculum development which are of concern to the students enrolled.

834. Supervised Field Service in Education. Three to five credit hours. Autumn, Winter, and Spring Quarters. Open only to students who hold the degree of Bachelor of Science in Education from The Ohio State University or its equivalent. Open only by arrangement with the Director of Student Teaching. Mr. Landsittel and supervisors.

Supervised teaching or other approved educational service under compensated appointment in a system of schools for a minimum, in conjunction with Education 835, of half of a school year, half-time throughout the year or full-time for half of the year. Critical pre-study of objectives, instruments, and procedures and after-evaluation; a general appraisal of the total experience or certain aspects thereof to form in all cases an integral part of the master's thesis.

Open only to candidates for the Master's degree in a teaching field in The Ohio State University. Credit to be withheld until eligibility for the degree otherwise has been attained.

* Not given in 1946-1947.

835. Supervised Field Service in Education. Three to five credit hours. Autumn, Winter, and Spring Quarters.

A continuation of Education 834.

*838. The Teaching and Supervision of English in the Secondary Schools. Three credit hours. Conferences, readings, reports. General prerequisites must include Education 670 (670a and 670b) and 671 (672) or permission of the instructor. Mr. Seely.

The course consists of two phases: (1) the analysis of contemporary contributions to the reorganization of materials and methods of secondary school English; (2) the study by each student of an individually selected problem.

HIGHER EDUCATION AND TEACHER TRAINING FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46, also on page 114.

845-*846. Higher Education I; Higher Education II; Basic Courses. Five credit hours. Winter Quarter. The work of each Quarter is so arranged that either course may precede the other. General prerequisites must include the satisfaction of basic course requirements for all graduate students in education. Open only to advanced graduate students. Mr. Anderson.

A basic survey of problems in higher education, particularly as these relate to theory, history, organization and administration, curriculum and method, and student personnel, including measurement.

*847. Theory and Administration of Higher Education. Five credit hours. Winter Quarter. General prerequisites must include five hours in education approved by the instructor and the satisfaction of basic course requirements for all graduate students in education. Mr. Klein.

This course will study the theoretical and practical problems involved in the administration of institutions of higher education under modern social conditions.

848. Curriculum and Method of Higher Education. Five credit hours. Spring Quarter. General prerequisites must include five hours in higher education and the satisfaction of basic course requirements for all graduate students in education. Mr. Hullfish, Mr. Kircher.

A study of the development, principles, and administration of the curriculum and of teaching methods in higher education.

850. Teacher Training. Five credit hours. Autumn Quarter. General prerequisites must include satisfaction of basic course requirements for all graduate students in education. Mr. Anderson.

A study of the problems of history, organization, administration, curriculum and method, student personnel (including measurement) peculiar to teacher training institutions.

852. Evaluation in Higher Education. Five credit hours. Autumn Quarter. Two meetings each week. Mr. Raths.

A course for college instructors and research workers, to acquaint them with the techniques used in measuring attainment in the several fields of college instruction. Students will have an opportunity to construct examinations and administer them.

SCHOOL LIBRARY SCIENCE

†645. The Library in the Modern School. Three credit hours.

A course designed primarily for teachers, supervisors, and administrators to acquaint them with the place of the school library in modern education. Objectives of school library service, integration of library and instruction, library standards, selection of personnel, housing and equipment of the library, costs of service, and broader concepts of library materials will be investigated.

NOTE: Attention is called to the service course (Psychology 680) offered for those majoring in Elementary or Secondary Education or the Superintendency.

* Not given in 1946-1947.

† Not given during the academic year, 1946-1947.

646. Enriching Curriculum Units through Use of Library Materials. Three credit hours. Winter Quarter. Miss Heller.

This course is designed to acquaint the student with library resources and materials of all kinds which will vitalize and give background to typical units of the school curriculum. Includes selection and study of materials correlating with subjects chosen for study in both elementary and secondary schools. Practice will be given in deciding upon appropriate study materials and in making bibliographies for selected subjects. Attempt will be made to show that the same materials may be used to enrich more than one subject.

***647. Reference Work in the School Library.** Three credit hours. Miss Heller.

The course includes study of the various reference books, such as encyclopedias, dictionaries, atlases, handbooks, gazeteers, and pamphlets, bulletins, government publications, pictures, museum objects, and other audio-visual aids. Practice in handling reference questions is provided.

†648. Library Guidance for Adolescent Readers. Three credit hours. Spring Quarter. Miss Heller.

A survey of the nature and content of books suitable for use in meeting the recreational reading needs of the adolescent group. The recreational reading program is considered as one cutting across the entire book collection and meeting a variety of interests, including those arising in any teaching area. Emphasis will be placed upon recreational reading as a means of furnishing background for the study of a foreign language, enriching interests arising in social studies classes, extending mathematical understandings, strengthening science interests, correlating with English teaching programs, broadening experiences in the arts, or helping in the solution of personal problems.

Demonstration and discussion of methods of stimulating and directing young people's reading will be provided.

INDUSTRIAL ARTS
FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

711. Selection and Organization of Subject Matter in Industrial Education. Three credit hours. Spring Quarter. Three recitation periods each week. Mr. Smith.

Principles and practice in defining specific area and course objectives and their relationship to the objectives of general education. General and specific criteria and controls determining the selection of subject matter and activities. Techniques of analysis applied to various industrial activities for the selection of facts and activities conducive to acquisition of desirable knowledge, skills, and behavior; and the organization of such materials into integrated courses of study and formulation of teaching plans.

715. Laboratory Planning and Equipment Selection in Industrial Arts. Three credit hours. Winter Quarter. Seven periods each week for lecture and laboratory. Permission of the instructor required. Mr. Haws.

Analysis of problems and standards involved in planning rooms and practice in the selection, design, location, installation, and care of equipment in various high school industrial arts laboratories or vocational shops.

†716. Administration of Industrial Education in Secondary Schools. Three credit hours. Spring Quarter. Mr. Stone.

Relation of Industrial Arts and Vocational Education to the general curriculum and the administrative responsibilities entailed. Courses of study; relative costs; coordination problems; class and shop organization, and the development of an effective program of supervision. Selection of teachers and their improvement in service. Of interest to school administrators and teachers of industrial arts and vocational-industrial subjects.

Not open to students who have credit for Education 857.

* Not given in 1946-1947.

† Not given during the academic year, 1946-1947.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46, also on page 114.

856. Practicum in Industrial Arts Education. Three to five credit hours. Autumn Quarter. Mr. Warner.

Investigations, reports and discussions concerning: nomenclature, historical development; analysis of professional objectives for their concepts; emphasis by grade levels; criterion basis of content selection and appraisal; teaching methods and devices; physical planning; organization; laboratory operation; evaluation; the teacher and his profession.

860. Scientific Studies in Practical Arts and Industrial Vocational Education. Two credit hours. Autumn Quarter. Mr. Smith.

An extensive view of research techniques applicable to the practical arts and vocational education; critical review and evaluation of published research examples in these fields; recognition and refinement of problems; study of research treatment; methods of writing and presenting research reports.

By permission of the Chairman of the Department of Education and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under the auspices of the Bureau staff.

866. Research in the Laboratory of Industries. Three or more credit hours. Winter Quarter. Conferences and studies using the activities in the Laboratory of Industries as a basis for research. In addition to the general prerequisites, teaching experience in Industrial Arts or Vocational Industrial Education and permission of the instructor are required. Mr. Warner.

Individual or group studies on a combination practicum and laboratory basis with the publication of either a professional or technical bulletin as a goal. Selection to meet the requirements of the group are suggested by: pupil study, diagnosis and achievement; problems of organizing and supervising a Laboratory of Industries; units of content; studies of industry; analysis of method; experimentation and development of programs.

BUSINESS EDUCATION
FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

721. Fundamental Principles of Teaching Business Subjects. Three credit hours. One Quarter. Autumn and Winter. Miss Wells.

A basic course in fundamental principles of teaching the business subjects. This course will orient the teachers in the entire field of business teaching in secondary schools and provide the background necessary for specialized courses 725 and 726.

†722. Principles of Business Education. Three credit hours. Autumn Quarter.

For teachers of business subjects in the junior or senior high schools. Meaning, purpose, and scope of business education in secondary schools. Importance of and procedure in making occupational surveys in the field of business education.

†724. Administration and Supervision of Business Education. Three credit hours. Spring Quarter. Mr. Stone.

A course designed for administrators and supervisors of business education in the junior and senior high school. Courses of study: laboratory facilities, selection and improvement of teachers in service; and other major executive problems.

†725. Selecting and Teaching Junior High School Business Subjects. Three credit hours. Education 721 must be included in the general prerequisites or taken concurrently.

A professional course for teachers of business arts (sometimes designated as general business science or junior business training) in junior high school for major purposes of exploration, guidance, and fundamentals of consumer business education. Teaching plans and observation of classroom procedures.

† Not given during the academic year, 1946-1947.

†726. **Selecting and Teaching Senior High School Business Subjects.** Two to four credit hours. Education 721 must be included in the general prerequisites or taken concurrently.

A professional course for teachers of senior, technical or vocational business high school business subjects, including shorthand, typewriting, business English, office practice, bookkeeping, salesmanship, business law, business geography, buiness arithmetic, etc. Teaching plans and observation of classroom procedures.

SUPERINTENDENCY

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

727. **Introduction to School Administration.** Three credit hours. Autumn Quarter. Required of graduate students preparing for school executive positions. Mr. Reeder.

Designed to give an overview of the organization and administration of education in the United States. The following topics, among others, are discussed: federal, state, and local administration; the philosophies of school administration; finance and business management; the plant; the teaching corps; the pupils; the materials of instruction; records and reports; public relations.

†729. **Administrative Problems of Rural and Village Superintendents.** Three credit hours. Winter Quarter. Three lectures each week. Assigned readings, investigations and reports. General prerequisites must include Education 727 or its equivalent.

Growth of consolidation; relationships with community interests such as church, lodge, and social service groups, relationships with local boards and county and state officials; problems of health, attendance; handicapped pupils; textbooks, supplies, pupil transportation; janitors; 4-H; FFA Clubs and other curricular and co-curricular activities; housing of teachers; supervision; teaching loads; scheduling.

†731. **Administration of Physical and Health Education.** Three credit hours. Assigned readings and reports. General prerequisites must include Education 727.

The study of the responsibility of administrators for the direction and supervision of health and physical education; organization, management and financing of programs; methods of securing and advising health and physical education staff; duties and services of these special officers; relations to public health; medical inspection; preventive programs; promotional programs; relations to mental health and hygiene; management and financing of athletics.

735. **Business Administration of Schools.** Two credit hours. Winter Quarter. Three lectures each week. Assigned readings, investigations and reports. General prerequisites must include Education 727 or its equivalent. Mr. Reeder.

Function of business administration in the schools; administrative relationships; personnel of the business department; making the budget; procuring revenue; financial accounting; financing capital outlays; janitorial service; school insurance; taking the inventory; supplies; payroll procedure; pupil transportation.

738. **Administration of Pupil Personnel.** Three credit hours. Spring Quarter. Three lectures each week. Assigned readings, investigations and reports. General prerequisites must include Education 727 or its equivalent. Mr. Heck.

Compulsory education laws and working certificates in Ohio and in other states; census information; school record systems; reporting systems; age-grade-progress studies; elimination, grading, and promotion; visiting teacher, clinical services; marking systems.

740. **Public School Relations.** Two credit hours. Autumn Quarter. General prerequisites must include Education 727 or its equivalent. Mr. Reeder.

Emphasis on the function of public relations in school administration and the means for securing desirable public relations; the following topics among others are discussed: the aims and criteria for desirable public relations; the superintendent and the board of education in the public-relations program; school publications; American Education Week, commencement, and other special events; organizing and conducting publicity campaigns; and public opinion of education and its measurement.

† Not given during the academic year, 1946-1947.

742. **Legal Aspects of School Administration.** Three credit hours. Spring Quarter. Three lectures each week. Assigned readings, investigations and reports. General prerequisites must include Education 727 or its equivalent. Mr. Lewis.

A study of the statutes and judicial decisions of the various states relating to education. Major topics: authority and responsibility of teachers; rights, privileges, and responsibilities of students; teachers' contracts and pensions; legal and illegal use of school property; contractural capacity and liability of public school officials; school boundaries and districts; taxation; legal aspects of the curriculum; and expenditures of school money.

†744. **Administration of School Retirement and Pension Systems.** One credit hour.

A general introductory treatment of the problems involved in creating and maintaining an adequate retirement system for the school employees of the state.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46, also on page 114.

*836. **School Surveys.** Three credit hours.

A study of the literature and methods of school surveys, as a basis for the investigation of practical problems in school administration and supervision.

†871. **Administrative Problems of the City Superintendent.** Two credit hours. General prerequisites must include Education 727 or the equivalent. Mr. Lewis.

Social and legal status of superintendent; his civic and economic relationships to other agencies of the community; city planning; labor unions; pressure groups; state and federal relationships; problems in nutrition and special care of pupils.

873. **Staff Personnel Administration.** Three credit hours. Autumn Quarter. General prerequisites must include 727 or the equivalent. Mr. Lewis.

Definitions; rise of industry, government and education; philosophy of; man analysis and job analysis; selection; interviewing; in-service training; appraisement; supervision; absenteeism; marital condition; promotion; contracts, certification, dismissal, health and recreation; ethics, morale; public and professional relations; pensions; tenure; salary schedules and other factors of economic and professional welfare.

875. **School Finance.** Three credit hours. Autumn Quarter. Three lectures each week. Assigned readings, investigations and reports. General prerequisites must include Education 727 or the equivalent. Mr. Reeder.

The literature and sources of data; trends of school costs; outlook for future costs; possible school economies; school expenditures vs. ability to expend; sources of school revenues; meeting a financial stringency; the equalization of educational opportunity; the control of school funds; school indebtedness.

878. **Federal Relations to State and Local School Systems.** Two credit hours. Autumn Quarter. Two lectures each week. Assigned readings, investigations and reports. General prerequisites must include Education 727 or the equivalent. Mr. Lewis.

Educational activities of the Federal government, past and present; relations to states, territories, and dependencies; principles governing these relationships. Responsibility of the state; various ways typical states meet this responsibility; relations to local authorities; functions at various levels; organizational structures.

†880. **Planning, Constructing, and Equipping School Buildings.** Three credit hours. Assigned readings, observation trips, reports. General prerequisites must include Education 727 or the equivalent. Mr. Holy.

A study of the major problems involved in determining the school building needs of a community, techniques for determining room requirements, types of buildings, their construction and adaptation to educational needs, school sites and present day equipment for school buildings.

† Not given during the academic year, 1946-1947.
* Not given in 1946-1947.

including types and arrangement of equipment for special and regular rooms, auditoriums, gymnasiums, libraries, cafeterias, offices, service systems, methods of selecting and purchasing equipment.

NOTE: For additional courses in the Superintendency area see Education 767, The Education of Exceptional Children; Psychology 680, Educational Tests and Measurements; Physical Education 683, Organization and Administration of Physical Education.

GUIDANCE

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

750. Fundamentals of Guidance. Three credit hours. Autumn Quarter. Mr. Stone.

A basic but advanced course for all students desiring a comprehensive knowledge of the history, theory and practice of guidance. Especially for graduate students desiring to specialize in this field. The course considers the aims, materials, techniques, and research instruments of all major divisions of guidance service.

751. Supervised Practice in Counseling. Three to five credit hours. Autumn Quarter. One two-hour recitation and discussion period and two to six hours laboratory each week. Lectures, reports, demonstrations, and laboratory practice. General prerequisites must include Education 750 or Psychology 640, and permission of the instructor. Given in alternate years. Mr. Smith.

Consideration of counseling problems at different school levels including out-of-school youth. Studies of counseling techniques and aids. Practice in counseling with young people, parents, class and homeroom teachers, visiting teachers, administrative officers, school physicians, psychologists, psychometrists, psychiatrists, employers, and others. Of interest to those preparing to counsel with youth.

752. Guidance through Social-Economic Studies. Five credit hours. Spring Quarter. General prerequisites must include Education 750, or permission of the instuctor. Mr. Stone.

This course is organized with particular reference to the needs of school advisers and teachers of social-economic (vocational) studies for major purposes of guidance.

***754. The Administration of Guidance Programs.** Three credit hours. Spring Quarter. General prerequisites must include Education 750.

Designed for school superintendents and high school principals and other executive officers in junior and senior high schools and junior colleges. Critical examination of the organization and administration of guidance programs in large and small school systems; the development of guidance programs for the school systems represented by the class membership.

755. Survey of Guidance Techniques. Three credit hours. Spring Quarter. General prerequisites must include Education 750 or its equivalent. Mr. Stone.

An overview of the various patterns and techniques of guidance procedure. Of interest not only to prospective specialists in guidance, but designed also for all who want a comprehensive survey of this field. Studies are made of requirements and opportunities for preparation in various lines of guidance specialization.

756. School and Community Resources for Guidance. Four credit hours. Spring Quarter. General prerequisites must include Education 750 or its equivalent.

A study of (a) organization and administration of school systems and school communities with particular reference to the needs of guidance workers, and (b) information needed by guidance workers concerning educational opportunities available to high school students and graduates. Emphasis will be placed upon the functional relation of the guidance worker to different types and concepts of school organization, upon information concerning in-school and out-of-school educational opportunities and choices at all levels, and upon teaching pupils how to evaluate for themselves in-school and out-of-school opportunities and choices.

* Not given in 1946-1947.

SPECIAL AND ADULT EDUCATION
FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

764. Supervised Teaching in Special Classes. Five credit hours. Spring Quarter. This course is given only upon special request. Miss Rosebrook.

Practice teaching for qualified students in classes for the mentally retarded, for behavior problem children, for the defective in speech, or for the deaf and the hard of hearing.

Students will be expected to devote one-third of their time, under the supervision of the University instructor in charge, to this course.

765. Principles and Methods of Teaching the Mentally Retarded. Three credit hours. Spring Quarter. Miss Rosebrook.

A critical study of the various methods which are used in teaching the mentally retarded. In connection with this course, opportunity for practice teaching mentally retarded children will be provided for students desiring it.

766. Principles and Methods of Teaching Behavior Problem Children. Three credit hours. Spring Quarter. Miss Rosebrook.

A critical study of principles and methods used in the adjustment of behavior problem children.

767. The Education of Exceptional Children. Three credit hours. Spring Quarter. Three lectures each week. Assigned readings, reports, and field trips. General prerequisites must include Education 727 or permission of the instructor in charge must be obtained. Mr. Heck.

History and development of special schools and classes; types defined; place in education; state encouragement and regulations; types of control; internal government; buildings and rooms; equipment; costs, teacher-training, experience, salaries; selection of other employees; characteristics of children; principles governing admittance, retention, and withdrawal; curriculum—academic, industrial, extra-curricular; methods of follow-up, etc.

770. Adult Education. Three credit hours. Winter Quarter. Mr. Nisonger.

A study of the nature, extent, and significance of adult education. Consideration of the psychological characteristics of the adult, influence of social and economic factors on adult needs, history and types of adult education, present trends, future development.

771. Parent Education. Three credit hours. Winter Quarter. Mr. Nisonger.

A study of the nature, extent and significance of the parent education movement; home and school relationships in the education of children; methods and resources in parent education; facilities for training professional and lay leaders; place of school administration and teachers in parent education; state programs of parent education.

NOTE: For additional courses in special and adult education, see the Bureau of Special and Adult Education, page 69.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46, also on page 114.

***898. Planning Community Adult Education Programs. Three credit hours. General prerequisites must include Education 770 and permission of the instructor must be obtained. Mr. Nisonger.**

A study of community agencies with adult education programs; how new programs may be developed in terms of needs which are not being met.

NOTE: For additional courses in special and adult education, see the Bureau of Special and Adult Education, page 73.

* Not given in 1946-1947.

SEMINAR AND RESEARCH

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," 46, also on page 114.

800. Seminars in Education. Two to five credit hours. Autumn, Winter, and Spring Quarters. Students may with the approval of their advisers register for more than one section of 800 or for the same section two or more times.

(a) Business Education. Autumn, Winter, and Spring Quarters.
(c) Elementary Education. Autumn and Winter Quarters. Miss Zirbes, Miss Streitz.
†(d) Guidance.
(e) Higher Education. Winter Quarter. Mr. Anderson.
(f) History of Education and Comparative Education. Autumn, Winter and Spring Quarters. Mr. Good.
(g) Industrial Arts Education. Winter Quarter. Mr. Smith.
(h) Industrial-Vocational Education. Mr. Smith.
(i) Philosophy of Education. Autumn, Winter, and Spring Quarters. Mr. Hullfish.
(j) Radio Education. Autumn, Winter, and Spring Quarters. Mr. Tyler, Mr. Kircher.
(k) Secondary Education. Autumn, Winter, and Spring Quarters. Mr. Eikenberry, Mr. Alberty.
†(l) Special and Adult Education.
(m) Superintendency. Autumn, Winter and Spring Quarters. Mr. Lewis, Mr. Reeder.
(o) Teaching of Foreign Languages. Spring Quarter. Mr. Tharp.
(p) Teaching of Mathematics. Winter Quarter. Mr. Fawcett.
(q) Teaching of Sciences. Autumn Quarter. Mr. Cahoon.
(r) Teaching of Social Studies. Autumn and Spring Quarters. Mr. Griffin.
(s) Visual Education. Autumn, Winter, and Spring Quarters. Mr. Dale.

950. Research in Education. Autumn, Winter, and Spring Quarters. Students may with the approval of their advisers register for more than one section of 950 or for the same section two or more times.

By permission of the Chairman of the Department and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under members of the Bureau staff.

(a) Business Education.
(b) Curriculum Techniques.
(c) Elementary Education. Miss Streitz, Miss Zirbes.
(d) Guidance. Mr. Smith, Mr. Anderson, Mr. Heck.
(e) Higher Education. Mr. Hullfish, Mr. Anderson, Mr. Raths.
(f) History of Education and Comparative Education. Mr. Good, Mr. Eckelberry.
(g) Industrial Arts Education. Mr. Smith.
(h) Industrial-Vocational Education. Mr. Smith.
(i) Philosophy of Education. Mr. Hullfish, Mr. Kircher.
(j) Radio Education. Mr. Tyler.
(k) Secondary Education. Mr. Alberty, Mr. Eikenberry, Mr. Eckelberry.
(l) Special and Adult Education. Mr. Heck, Mr. Nisonger, Miss Rosebrook, Miss Sanderson.
(m) Superintendency. Mr. Lewis, Mr. Reeder, Mr. Heck, Mr. Bennett.
(n) Teaching of English. Mr. Seely, Mr. Eberhart.
(o) Teaching of Foreign Languages. Mr. Tharp.
(p) Teaching of Mathematics. Mr. Fawcett.
(q) Teaching of Sciences. Mr. Cahoon, Mr. Haub.
(r) Teaching of Social Studies. Mr. Landsittel, Mr. Griffin.
(s) Visual Education. Mr. Dale.

ELECTRICAL ENGINEERING

Office, 171 Robinson Laboratory

PROFESSORS DREESE, CALDWELL (EMERITUS), AYRES, KIMBERLY AND TANG, ASSOCIATE PROFESSORS BOONE, HIGGY, KRAUS AND PREBUS, ASSISTANT PROFESSORS WARREN, WEIMER, AND WANG

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

The following courses do not carry graduate credit for a student who received the degree of Bachelor of Electrical Engineering from The Ohio State University: 603, 604, 607, 611, 642, 643, 661, 701, 702, 705, 706, 741, 750, 751, 752, 753, 754, and 755.

† Not given during the academic year, 1946-1947.

603. Alternating Current Circuits. Five credit hours. Autumn Quarter. Five class hours each week. Mr. Tang.

Resistance, inductance, capacitance, reactance, impedance, mutual inductance series and parallel circuits, complex circuits, coupled circuits, power, power factor, polyphase systems. Complex notation, network theorems, Fourier analysis, and transients in simple circuits.

604. Alternating Current Laboratory. Two credit hours. Autumn Quarter. Three laboratory hours each week. Electrical Engineering 603 must be taken concurrently. Mr. Tang.

Laboratory study of wave forms, series and parallel circuits, phase differences, Fourier analysis, coupled circuits, and network theorems.

607. Engineering Electronics. Four credit hours. Winter Quarter. Three class hours and three laboratory hours each week. General prerequisites must include Electrical Engineering 603 or equivalent. Mr. Boone.

Electron tube characteristics and equivalent alternating current circuits; analysis of linear amplifiers and amplifier coupling; inverse feedback; electron tube oscillators theory and application of gas-filled tubes; methods of control of thyratrons; rectifiers and power supplies.

611. Medium and High Frequency Circuits. Four credit hours. Winter Quarter. Three class hours and one three-hour laboratory period each week. General prerequisites must include Electrical Engineering 603. Mr. Tang.

General analysis of alternating current circuits under wide ranges of frequency and impedance conditions. Network theorems, resonance phenomena, modulation, bridge circuits, coupled circuits and polyphase systems. Alternating current measurements at medium and high frequencies.

642. Electrical Engineering. Four credit hours. One Quarter. Autumn, Winter, Spring. Three class hours and three laboratory hours each week. Mr. Kimberly, Mr. Weimer, Mr. Wang.

The electric current and its effects. Direct and alternating current circuits. Electrical measurements. Magnets and their application. Electric heating.

643. Electrical Engineering. Four credit hours. One Quarter. Autumn, Winter, Spring. Three class hours and three laboratory hours each week. General prerequisites must include Electrical Engineering 642 or equivalent. Mr. Kimberly, Mr. Weimer, Mr. Wang.

A continuation of electrical engineering fundamentals. Transmission and distribution. D-c motors and generators and their control. A-c motors and their application and control, a-c generators, meters, power and energy rates, power, factor correction, transformers, economics of engineering applications.

644. Industrial Electronics and Controls. Four credit hours. Spring Quarter. Three class hours and one three-hour laboratory each week. General prerequisites must include Electrical Engineering 642.

Industrial applications of electronic devices involving photoelectric tubes, vacuum tubes and gas filled tubes for controls and power conversion.

648. Electronic Devices and Circuits. Four credit hours. Autumn Quarter. Three class hours and one three-hour laboratory each week.

This course is primarily for non-engineering science students who find some knowledge of electronic devices necessary in the pursuit of their scientific work.

701. Alternating Current Apparatus. Four credit hours. Autumn Quarter. Four class hours each week. General prerequisites must include Electrical Engineering 603, 604, and 611; Electrical Engineering 705 must be taken concurrently. Mr. Dreese.

Theory of transformers, synchronous generators, synchronous motors, induction motors, and apparatus.

702. Alternating Current Apparatus. Four credit hours. Winter Quarter. Four class hours each week. General prerequisites must include Electrical Engineering 701. Mr. Dreese.

Continuation of Electrical Engineering 701.

703. Advanced Alternating Current Circuits. Four credit hours. Autumn Quarter. Three class hours and three laboratory hours each week. General prerequisites must include Electrical Engineering 611. Mr. Ayres.

The propagation of alternating currents over long lines, loading, electrical filters, inductive interference.

704. Elementary Field Theory. Three credit hours. Spring Quarter. Three class hours each week.

Electrostatic and magnetostatic fields theory as expressed in the mks system of units, fields in simple electrode geometry, introduction to electromagnetic field theory and Maxwell's Equations, and computation of the physical constants of circuit elements in terms of their geometry.

705. Alternating Current Machinery Laboratory. Three credit hours. Winter Quarter. Five laboratory hours each week. General prerequisites must include Electrical Engineering 603, 604, 611 and 701. Mr. Dreese.

Laboratory study of a-c machinery.

706. Alternating Current Machinery Laboratory. Three credit hours. Spring Quarter. Five laboratory hours each week. General prerequisites must include Electrical Engineering 702. Mr. Dreese.

Continuation of Electrical Engineering 705.

708. Servo Mechanisms. Four credit hours. Autumn Quarter. Three class hours and one three-hour laboratory each week.

Automatic, electro, mechanical devices, utilizing servo mechanism principles and theory.

710. Introduction to Electric Power Systems. Four credit hours. Spring Quarter. Three class hours and one three-hour laboratory period each week. General prerequisites must include Electrical Engineering 712 and 752.

Fundamentals of power system engineering including calculation of fundamentals, constants of transmission lines and electrical apparatus, short circuit calculations, system stability, relaying, lightning and distribution.

711. Introduction to Electric Power Systems. Four credit hours. Winter Quarter. Three class hours and one three-hour laboratory period each week. General prerequisites must include Electrical Engineering 701 and 703.

Fundamentals of power-system engineering including calculation of fundamentals, constants, of transmission lines and electrical apparatus, short circuit calculations, system stability, relaying, lightning and distribution.

712. Introduction to Electric Power Systems. Four credit hours. Spring Quarter. Three class hours and one three-hour laboratory period each week. General prerequisites must include Electrical Engineering 711.

Continuation of Electrical Engineering 711.

713. Advanced Electric Machine Theory. Four credit hours. Spring Quarter. Three class hours and one three-hour laboratory each week. General prerequisites must include Electrical Engineering 752.

An analysis of the various revolving and stationary fields found in electrical machinery. Composite machines.

717. Communication Engineering. Four credit hours. Winter Quarter. Three class hours and three laboratory hours each week. General prerequisites must include Electrical Engineering 703 and 607. Mr. Boone, Mr. Kraus.

Equalizers, coupled circuits at radio frequency, impedance matching networks, and the use of vacuum tubes as oscillators, amplifiers and detectors at medium and high frequencies.

720. Electrical Illumination. Four credit hours. Winter Quarter. Three class hours and three laboratory hours each week.

Illumination, its development and present methods. Modern light-sources, and modification of light by reflectors, globes and other accessories. Light phenomena associated with illumination, such as reflection, transmission and absorption, direction and diffusion, refraction and color. Infra-red and ultra-violet radiation. Applications of illumination to industrial work, buildings, street-lighting, aviation, light-projection, etc.

721. Electrical Illumination. Four credit hours. Spring Quarter. Three class hours, three laboratory hours, and six hours of preparation each week. General prerequisites must include Electrical Engineering 720.

A continuation of Electrical Engineering 720. Inspection trips may replace some laboratory hours.

722. Electrical Illumination. Three credit hours. Autumn Quarter. Three class hours each week.

Modern lighting, both electric and daylight, especially as applied to buildings, such as industrial plants, stores, schools, residences, etc. A brief study of lamps and accessories and the phenomena of reflection, transmission, glare, diffusion, color, etc., as they affect illumination design. Circuits for electric lighting and their control.

726. Advanced Electrical Communication. Four credit hours. Spring Quarter. Three class hours and three laboratory hours each week. General prerequisites must include Electrical Engineering 717. Mr. Boone, Mr. Kraus.

An advanced study of medium and high frequency alternating current circuits. Radiation fields and their measurement.

727. Applied Electro Magnetic Wave Theory. Four credit hours. Spring Quarter. Three class hours and three laboratory hours each week. General prerequisites must include Electrical Engineering 726.

Electromagnetic field theory as applied to antenna systems, wave guides, cavities, and electromagnetic horns.

728. Elements of Industrial Electronics. Four credit hours. Winter Quarter. Three class hours and one three-hour laboratory period each week. General prerequisites must include Electrical Engineering 607, 751 and 753.

Fundamentals of industrial electronic control including use of photocells, gas-filled tube applications, power rectifiers, ignitron applications, trigger circuits, welder control, motor and generator control, sequence relaying, electrostatic precipitator, industrial X-Ray equipment.

729. Advanced Electronics. Four credit hours. Winter Quarter. Three class hours and one three-hour laboratory period each week. General prerequisites must include Electrical Engineering 607.

The electrical engineering of vacuum and gas-filled tubes; application to gaseous rectifiers.

730. Practical Electron Optics. Four credit hours. Autumn Quarter. Three class hours and three laboratory hours each week. General prerequisites must include Electrical Engineering 729.

Elementary theory of electron motion in static, magnetic, and electric fields, particularly in projection systems of television, radar, and electron-microscope apparatus. Mathematical and experimental methods for evaluation of focusing fields, trajectories and cardinal points of electron lenses. Electron motion in varying electric and magnetic fields.

732. Engineering Projects. Four credit hours. Spring Quarter. Six hours in calculation periods each week. General prerequisites must include Electrical Engineering 741. Mr. Dreese.

A study of electrical projects involving a correlation of the fundamental principles of mechanics, heat, finance and electrical engineering for some desired end. Another important objective of the course is to inculcate the spirit of the attack on an engineering problem and to demonstrate the interplay of factors involved in a decision by an engineering organization.

738. Control and Protection of Electric Power Equipment. Four credit hours. Spring Quarter. Three class hours and three laboratory hours each week. General prerequisites must include Electrical Engineering 751 and 753.

Fundamentals of control of electrical-machinery and apparatus including a-c and d-c motor and generator control, automatic phase switching, amortisseur winding protection, overload protection, saturable reactors, voltage regulators.

739. High-Frequency Measurements. Three credit hours. Spring Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 726.

The measurement of voltage, current, power, impedance, and field-intensity, antenna pattern measurements, special measurements.

741. Economics and Organization of the Electrical Industry. Four credit hours. Autumn Quarter. Four class hours each week. General prerequisites must include a course in direct current apparatus and Electrical Engineering 611 or 643. Mr. Ayres.

Principles of engineering economy and financial analysis applied to electrical industry in its principal divisions: power supply, communications, manufacturing and merchandising.

745. Laboratory Study of Alternating-Current Equipment. Three credit hours. Spring Quarter. Five laboratory hours each week. General prerequisites must include Electrical Engineering 752 and 755.

The study of synchronous converters, variable-speed (BTA) motor, three-phase transformers, three-phase induction motors in concatenation, phase advancer, etc.

749. Electron and Ion-Accelerating Theory and Methods. Three credit hours. Spring Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 607 or equivalent.

Operating theory and basic design features of high energy accelerators including modern developments for relativistic particles. Voltage doublers, electrostatic generators, resonance magnetic accelerators, induction accelerators, resonance transformer accelerators, linear accelerators. Electron and ion sources and preaccelerators.

750-751-752. Electrical Machinery Theory. Four credit hours each Quarter. Spring, Autumn, Winter. Four class hours and three calculation hours each week. General prerequisites must include for 750, Electrical Engineering 603, 604, 611; prerequisite for 751, Electrical Engineering 750; prerequisite for 752, Electrical Engineering 751.

Theory of transformers, synchronous generators, synchronous motors, induction motors and direct current machines.

753-754-755. Electrical Machinery Laboratory. Two credit hours each Quarter. Autumn, Winter, Spring. One four-hour laboratory period each week. General prerequisites must include for 753, Electrical Engineering 750; prerequisite for 754, Electrical Engineering 751, 753; prerequisite for 755, Electrical Engineering 752, 754.

Electrical machinery laboratory for Electrical Engineering 750-751-752.

757. Ultra High Frequency Engineering. Four credit hours. Winter Quarter. Three class hours and the laboratory hours each week. General prerequisites must include Electrical Engineering 607 and 703. Mr. Boone, Mr. Kraus.

The generation and detection of ultra-high frequency oscillations at wave lengths of a few centimeters, their transmission by two conductor lines and wave guides, their control in time and space and the recording of their behavior. A study of the use of velocity modulation tubes, magnetrons, electromagnetic field theory, wave guides, transient phenomena, electromagnetic horns, antennas, wide band amplifiers and multiple detection receivers as used in applications of ultra-high frequency phenomena.

758. Ultra High Frequency Engineering. Four credit hours. Spring Quarter. Three class hours and three laboratory hours each week. General prerequisites must include Electrical Engineering 757. Mr. Jordan, Mr. Wang.

A continuation of Electrical Engineering 757.

760-761-762. Advanced Theoretical Study of Electrical Engineering Practice and Equipment. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. All instructors.

765-766-767. Special Advanced Laboratory. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. All instructors.

770. Analysis of Electrical Engineering Problems. Three credit hours. Spring Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 603. Mr. Dreese.

The content will be selected from the following fields: differential equations, Heavyside operators. The applications will be illustrated by examples from electrical engineering and related fields. Electrical circuit analogies.

780. **Engineering Industrial Problems.** Three credit hours. Spring Quarter. Three class periods each week. General prerequisite must include Electrical Engineering 701 or 702, or 642 or 643. Mr. Kimberly.

Layout of electrical distribution systems for factories and municipalities, electrolysis investigation, special cases of electric drive and control, engineering aspects of patents.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

These prerequisites include foundation courses in mathematics, physics and electrical measurements.

The general prerequisites include for 821 and 824, Electrical Engineering 701 and 702, or equivalent; for 825, Electrical Engineering 824; for 826, Electrical Engineering 824; for 832, Electrical Engineering 717, or equivalent.

Graduate work will be given to individual students and groups under the course numbers given below. The following are the fields of special interest of the instructors listed. Other lines of study, are, however, taken up under their supervision. Mr. Dreese, Electrical Machinery. Mr. Ayres and Mr. Warren, Transmission and Distribution, Alternating Current Apparatus, Electric Traction. Mr. Kraus, Electrical Communication. Mr. Kimberly, Electrical Instruments, Alternating Current Apparatus. Mr. Tang, Illumination, Alternating Current Apparatus, Electrical Mathematics. Mr. Boone, Electronics. Mr. Weimer, Servo Mechanism. Mr. Prebus, Electron Optics. Mr. Wang, Betatron Studies.

801-802-803. **Advanced Theoretical Study of Electrical Engineering Practice and Equipment.** Credit hours to be arranged. Autumn, Winter, and Spring Quarters.

805-806-807. **Advanced Laboratory Study of Electrical Engineering Equipment.** Credit hours to be arranged. Autumn, Winter, and Spring Quarters.

808. **Advanced Study of Small Motors.** Three credit hours. Spring Quarter. Three class hours each week. General prerequisites must include satisfactory preparation in electrical-machinery theory and laboratory.

The study of the double revolving field theory, the cross-field theory, and the symmetrical-component method of analyzing the performance of single-phase motors. The determination of machine constants for these motors.

811. **Matrices in Electrical Engineering.** Three credit hours. Spring Quarter. Three class hours each week.

A study of the fundamentals of matrix algebra, followed by the application of matrices to the solution of general static networks. Symmetrical components. Problems of three-phase circuits, and n-terminal networks, will be considered. This course serves as a good introduction to the application of tensor algebra to electrical engineering problems.

815. **Transients in Linear Systems.** Three credit hours. Autumn Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 703, Mathematics 607 and 611.

Modern methods of solution of transient phenomena in electrical, mechanical, and thermal linear systems involving lumped and distributed parameters. Use of direct and inverse Laplace transformations in solution of ordinary integro-differential and difference equations. Use of operation and function transforms.

816. **Transients Laboratory.** Two credit hours. Winter Quarter. One class hour and three laboratory hours each week. General prerequisites must include Electrical Engineering 815.

Techniques in laboratory studies of transient phenomena. Use of oscilloscopes and rotating switches. Methods of analysis and computation in transient problems. Experimental solution of specific problems.

821. **Revolving Fields and Permeances in Electrical Machinery.** Three credit hours. Autumn Quarter. Three class hours each week.

An analysis of the various revolving and stationary fields found in electrical machinery. The origin and effects of both useful and parasitic fluxes are considered. Discontinuities and cusps in speed-torque curves of induction machines, synchronous-motor effects in induction machines, sub-synchronous speeds in induction and synchronous machines, and design for sub-synchronous operation are topics studied in this course.

822. Revolving Fields and Permeances in Electrical Machinery. Three credit hours. Winter Quarter. Three class hours each week.

Continuation of Electrical Engineering 821.

824. Advanced Alternating-Current Machinery. Three credit hours. Autumn Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 752 and 755.

General development of theory of symmetrical components for application in the operation of synchronous machines under unbalanced conditions, such as different short circuits on an alternator. The study and determination of the different sequence reactances of the synchronous machine. The two reaction theory as applied to selwyn motors. The consideration of transient characteristics of synchronous machines.

825. Advanced Alternating-Current Machinery. Three credit hours. Winter Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 824.

Continuation of Electrical Engineering 824.

831. Network Analysis and Synthesis. Three credit hours. Winter Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 703 and 717.

General treatment of lumped and distributed networks, such as long lines, filters and equalizers, including design of composite filters; use of matrices in analysis; operation of filters in parallel.

832. Fundamentals of Electromagnetic Theory. Three credit hours. Spring Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 704 or equivalent.

Vector analysis, electrostatics, magnetostatics, Maxwell's equations, fundamental theorems, plane waves, polarization.

833. Electro-Mechanical Systems. Three credit hours. Autumn Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 726.

Fundamental analogies with lumped and distributed circuits, acoustics, mechanical elements in filters, crystal theory.

835. Symmetrical Components. Three credit hours. Autumn Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 703 and 752.

Theory and application of symmetrical components to the analysis of power-system networks. A detailed study of sequence constants of transmission circuits and other electrical apparatus. The use of sequence networks in the calculation of unbalanced faults on power networks. Applications to problems of system grounding, relaying, and unbalanced operation of electrical apparatus.

836. Symmetrical Components. Three credit hours. Winter Quarter. Three class hours each week.

A continuation of Electrical Engineering 835.

837. Electric Power-System Analysis. Three credit hours. Winter Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 835.

Steady state solution of power networks, power flow and regulating transformers. Theory and application of circle diagrams. Transient performance of rotating machines during balanced and unbalanced operation. Calculation of circuit-breaker interrupting duty. Steady state and transient stability of power systems, high-speed relaying, rapid reclosing and single-pole reclosing, high-speed excitation.

838. Electric Power-System Analysis. Three credit hours. Spring Quarter. Three class hours each week.

A continuation of Electrical Engineering 837.

*839. Traveling Waves on Transmission Systems. Four credit hours. Autumn Quarter. Four class hours each week. General prerequisites must include Electrical Engineering 703.

Theory of wave propagation on single and multi-wire lines. Reflection and refraction of waves. Theory of lightning formation and review of statistical data on lightning phenomena. Impulse characteristics of insulation and insluation coordination.

*840. Power System Economics. Four credit hours. Spring Quarter. Four class hours each week. General prerequisites must include Electrical Engineering 712, 741.

Economic selection and location of stations and equipment, economic loading of machines. Distribution system layout and design. Substation economics and design.

841. Electron-Tube Theory and Design. Three credit hours. Winter Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 729.

Analysis of the potential distribution in high-vacuum electron tubes, tube parameters as determined by electrode geometry, design methods to provide specific performance, thermionic cathodes and problems relating to cathode activity.

842. Geometrical Electron Optics. Three credit hours. Winter Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 730 and Mathematics 611.

Introduction to calculus of variations; the fundamental significance of Fermat's Principle: Euler-Lagrange equations and the conditions for image formation, ideal optical projections. The characteristic functions of Hamilton. General theory of abberations. The third-order aberrations of symmetrical electron optical systems. General theory of deflecting systems.

*843. High-Power Electron Lenses. Three credit hours. Spring Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 842.

The study of electron lenses typical in transmission electron-microscopes.

†844. Theory and Survey of Variable Conductors. Three credit hours. Spring Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 729.

A generalized study of the theory of variable conductors such as high-vacuum tubes, gaseous conductors, copper-oxide rectifiers, thyrite resistors and other conducting elements whose properties depend upon voltage, temperature, or other factors.

845. Vacuum-Tube Electronics at High-Frequencies. Three credit hours. Winter Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 757 and 841.

Electronic analysis of electron tubes including electron inertia effects; network representation of the tube as determined by frequency; application of linear four-pole theory to small signal and noise analysis; velocity variation tubes.

*846. Vacuum-Tube Networks. Three credit hours. Spring Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 845 and Mathematics 607.

Within a specified frequency range the treatment of high-vacuum electron tubes in equivalent networks for the purpose of network analysis and synthesis; selection of tubes in terms of derived-merit figure such as gain-band, power-band, and signal-to-noise merit.

†847. Theory and Design of Servo-Mechanisms. Four credit hours. Winter Quarter. Three class hours and three laboratory hours each week. General prerequisites must include permission of the instructor.

Synchro transmitters, receivers, differentials, and other basic components; function and basic design of automatic control systems; transient response and control response of an error-controlled system; contactor, hydraulic, electro-hydraulic, amplidyne, rototrol, and other servo-systems.

* Not given in 1946-1947.
† Not given during the academic year, 1946-1947.

*848. Synthesis of Linear Servo-Mechanisms. Three credit hours. Spring Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 815, 847 and Mathematics 607.

The synthesis of basic controller networks.

†850. Wave Guides and Resonators. Three credit hours. Autumn Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 832.

Parallel plane wave-guides, rectangular and cylindrical wave-guides, transmission line theory, resonators, discontinuities in wave-guide and transmission lines.

*851. Radiation and Radiating Systems. Three credit hours. Winter Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 832.

Fundamental theorems, radiation from horns, antennas, classical antenna theory, directional antennas, impedance receiving antennas.

*852. Propagation of Electromagnetic Waves. Three credit hours. Spring Quarter. Three class hours each week. General prerequisites must include Electrical Engineering 851.

Diffraction, reflection, and refraction of waves, antenna over a plane earth, antenna over a spherical earth, propagation in an ionized medium.

950. Research in Electrical Engineering. Autumn, Winter, and Spring Quarters. All instructors.

NOTE: Detailed schedules of graduate studies available under the above course number may be obtained on application to the Department of Electrical Engineering.

Courses carrying this number involve a research problem selected by the student in consultation with his adviser.

ENGINEERING DRAWING

Office, 218 Brown Hall

PROFESSOR PAFFENBARGER

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

701. Chemical Machine Drawing. Two credit hours. Winter Quarter. Six laboratory hours each week. Mr. Paffenbarger.

The drawing and introduction to the design of machinery and apparatus as related to industrial chemistry and chemical engineering.

704. Chemical Plant Layout and Design. Four credit hours. Spring Quarter. Twelve laboratory hours each week. General prerequisites must include Engineering Drawing 701. Mr. Paffenbarger.

Sketching and preliminary layout of industrial chemical plants. Design and drawing of a complete plant for the manufacture of a chemical or related product.

NOTE: TEACHING COURSES. For the Teaching Courses in this department see the Department of Education, Courses 696, 697, and 698.

ENGINEERING EXPERIMENT STATION

The Engineering Experiment Station is a division of the College of Engineering and was established by law to conduct technical research. The Station

* Not given in 1946-1947.

† Not given during the academic year 1946-1947.

is authorized to cooperate with divisions of the State and National governments and with private individuals and corporations.

In many cases the Station investigations are such as may properly be conducted by graduate fellows working under direction of members of the faculty or Station staff. It follows, therefore, that not infrequently candidates for a graduate degree work out their theses or dissertations utilizing the equipment of the Station.

ENGLISH

Office, 120 Derby Hall

PROFESSORS FULLINGTON, McKNIGHT (EMERITUS), BECK (EMERITUS), PERCIVAL, HATCHER, WALLEY, WILSON, DERBY, HARROLD, PARKER, AND CHARVAT, ASSOCIATE PROFESSORS SNOW, UTLEY, ESTRICH, AND HILDRETH, ASSISTANT PROFESSORS CRAIG, LOGAN, HUGHEY, DUMBLE, SNIFFEN, WHITMER, HOFFMAN, AND ALTICK

General Information for Graduate Students:

(1) Graduate study in English requires an undergraduate major in English (i.e., not less than the equivalent of forty Quarter hours in advanced courses in English and related subjects, at least twenty-five of which must be in English). Students deficient in this respect must make up the deficiency by taking such extra or compensatory work as the department advisers may deem necessary.

(2) Graduate students taking work leading toward the M.A. degree generally fall in one of two classifications: (a) those desiring to take further academic work possibly leading to the Ph.D. degree, and (b) those planning a professional career in secondary schools. It is expected that the course of study for the M.A. (academic) will differ from that for the M.A. (professional).

(3) The requirements for the M.A. (academic) are forty-five hours of English and related subjects. Concentration in a field of study is desirable and will be arranged with respect to the student's needs. The master's thesis should be of such nature as to demonstrate the candidate's ability to carry on research. The final examination will be limited to the candidate's major field of concentration, in which he will be expected to demonstrate a high degree of competence.

(4) The requirements for the M.A. (professional) are forty-five hours of English and related subjects so comprehensively planned that the candidate will have an adequate knowledge of (a) the history and development of the English language, (b) teaching methods in English, and (c) the chief figures and epochs of English and American Literature from Chaucer to the modern day. Ordinarily at least twenty-five hours of English will be required for this program, but special arrangements may be possible for the mature student whose undergraduate preparation has been unusually thorough, and who may need special work in other departments for the advancement of his professional career. The master's thesis on this program will be a critical or historical study of some aspect of a major figure or epoch in English or American literature. In the final examination the candidate will be expected to demonstrate a comprehensive knowledge of the main developments in the history of English and American language and literature, and to prove his competence as an interpreter and critic of literature.

(5) All graduate students working for the M.A. degree will be expected to consult regularly with the duly appointed department advisers for that degree, and no program for such work will be accepted by the Department until it has been formally approved. Candidates for the M.A. degree will be expected to take their work in "600", "700", and "800" courses. Of these, at least 25 hours (including the thesis) must be on the "700" and "800" level. Before admission to candidacy, the student must have completed 30 hours of graduate work with a point-hour-ratio of 3.0 or better.

(6) The requirements for the Ph.D. degree in English are (a) at least one full year (forty-five hours) of study after the completion of the M.A. (or its equivalent), (b) a thorough reading knowledge of one modern foreign language, and a working knowledge of one other language, ancient or modern (to be determined by the candidate's needs for his field of specialization), (c) the satisfactory passing of a written and oral examination for admission to candidacy, and (d) the submission of a satisfactory thesis. Candidates for the Ph.D. will be expected to take their work in the "700" and "800" courses. Courses on the "600" level may be taken for credit only by permission of the Chairman of the Graduate Committee.

Graduate students interested in instruction or study not provided by the formal offerings should consult with the Chairman of the Graduate Committee or with their advisers on possible arrangements.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

601. American Literature During the Colonial and Early Republican Period. Five credit hours. Winter Quarter. Given in alternate years. Mr. Pearce.

The evolution of American literary culture, from its British and French origins to the native romanticism of Irving, Cooper, and Bryant.

609. The American Renaissance in Literature. Five credit hours. Autumn Quarter. Mr. Charvat.

An introduction to the major writers of the Romantic movement in America: Poe, Hawthorne, Melville, Emerson, Thoreau, Whitman.

Not open to students who have credit for English 608.

615. Twentieth Century American Writers. Five credit hours. Spring Quarter. Mr. Hoffman.

Study of significant themes in the work of American writers of the contemporary period whose roots are predominately native, from the first World War to the present.

625. Standards of English Usage. Five credit hours. Winter Quarter. Mr. Estrich.

This course provides training in standards of grammar, spelling, pronunciation, and vocabulary for students interested in writing, teaching, the art of expression, or the development of their own culture. The approach is functional throughout, rather than historical or descriptive.

Not open to students who have credit for English 528.

***627. The Language We Speak.** Five credit hours. Autumn Quarter. Mr. Utley.

A study of the history of English, of its words and structure and logic, of its cultural patterns and philosophical significance, of its use as an instrument of communication and human living.

635. The Age of Wit and Satire. Five credit hours. Autumn Quarter. Given in alternate years. Mr. Wilson.

The skeptical and critical mind of the Early Enlightenment as reflected in lyric and satiric verse from Dryden through Pope; the comic wit of the Restoration, and the bitter wit of Swift.

637. Johnson and His Circle. Five credit hours. Spring Quarter. Given in alternate years. Mr. Percival.

The character and opinions of Dr. Johnson, as found in Boswell's *Life of Johnson* and *Tour of the Hebrides*, with attention to the members of his circle, and as a background, the ideals of the Enlightenment.

641. The Romantic Temper. Five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Snow, Mr. Harrold.

The influence of the French Revolution and the preeminence of the Romantic ideal. Wordsworth, Coleridge, Byron, Shelley, Keats, Hazlitt, Lamb, De Quincey, Scott, and Jane Austen.

642. The Victorian Compromise. Five credit hours. One Quarter, Autumn, Winter, Spring. Mr. Harrold, Mr. Derby.

The spirit and temper of the Victorian period as seen in the poetry of Tennyson and Browning, the essays of Carlyle and Ruskin, three representative Victorian novels, the poetry and prose of Arnold, the Pre-Raphaelites, and the later minor Victorians.

643. The Writing Laboratory. Five credit hours. Spring Quarter. Three group meetings and individual conferences each week. Permission of the instructor. Mr. Snow.

This course will require writing of some scope in the shorter forms of fiction, in the essay, or in criticism, depending on the direction of talent of the individual student. Guidance will be given in the problems of writing through conferences and group discussions. Ten modern books will be used and discussed as examples of writing practice.

* Not given in 1946-1947.

*654. Introduction to Medieval English Literature. Five credit hours. Spring Quarter. Given in alternate years. Mr. Estrich.

Study of significant literary masterpieces from the twelfth, thirteenth, and fourteenth centuries, concluding with selections from Chaucer. The literature, largely narrative is chosen for its value in interpreting the later Middle Ages as well as for its independent worth.

*655. The Novel. Five credit hours. Winter Quarter. Given in alternate years. Mr. Hatcher.

A study of the novel, not as an historical survey, but as a preferred international art form from Trollope and Flaubert to the present day. An acquaintance is assumed with the standard authors, such as Fielding, Scott, Austen, Dickens, and Thackeray.

669. The Older Drama. Five credit hours. Autumn Quarter. Given in alternate years. Mr. Wilson.

The history of English Drama, from the Elizabethans to the early Nineteenth Century—a survey of important types and forms considered in connection with their social and theatrical backgrounds. The best plays of Marlowe, Jonson, Beaumont and Fletcher, Dryden, Congreve, Cibber, Rowe, Goldsmith, Sheridan, and others.

Not open to students who have credit for English 677.

670. Recent and Contemporary Drama. Five credit hours. Winter Quarter. Given in alternate years. Mr. Hatcher.

The social, intellectual, and scientific forces characteristic of recent times reflected in the artistic medium of the plays of Ibsen, Strindberg, Hauptmann, Wedekind, Kaiser, Toller, Chekov, Gorky, Andreyev, Brieux, Rostand, Maeterlinck, Vildrac, Capek, Molnar, Schnitzler, Pirandello, Benavente, Wilde, Shaw, Galsworthy, O'Casey, Milne, Howard, Rice, Barry, O'Neill, and others.

671. Milton and the Literature of Crisis. Five credit hours. Spring Quarter. Given in alternate years. Mr. Parker.

Study of Milton's period as an age of spiritual and political conflict as reflected in its non-dramatic literature, particularly the writing of Milton. Consideration of Spenser and Puritanism, metaphysical poetry and religious reaction, growth of the classical temper and scientific spirit, development of modern prose.

674. The Temper of the Renaissance. Five credit hours. Winter Quarter. Given in alternate years. Mr. Walley.

A consideration of English thought and expression during the Sixteenth and Seventeenth Centuries in the light of their enduring contribution to the adventure of human living.

676. Shakespeare. Five credit hours. Autumn Quarter. Given in alternate years. Mr. Walley.

A critical consideration of the art, personality, and achievement of Shakespeare in the light of Renaissance culture. Shakespeare's work is viewed as an integrated totality and evaluated in terms of its significance for modern times.

701. Minor Problems in English. One to five credit hours. Summer, Autumn, Winter, and Spring Quarters.

Students may register for individual directed study under this number by arrangement with the appropriate member of the staff.

†708. Studies in Mid-Century American Symbolism and Idealism. Five credit hours. Winter Quarter. Five class meetings each week. Given in alternate years. General prerequisites must include English 609 or the equivalent. Mr. Charvat.

An intensive study of the major Romantics, Poe, Hawthorne, Melville, Whitman, Emerson, Thoreau, in relation to the American environment and foreign influences. The course assumes that the student has an acquaintance with the basic writings of the period as developed in English 609.

709. Studies in American Realism and Naturalism. Five credit hours. Spring Quarter. Given in alternate years. Mr. Charvat.

An intensive study of important fiction from Twain to Dreiser and the social and literary background. The course assumes that the student has an acquaintance with the basic fiction of the period as developed in English 510.

* Not given in 1946-1947.

† Not given during the academic year, 1946-1947.

†715. **Studies in English or American Literature.** Five credit hours. This course may be repeated with the permission of the Chairman of the Department of English until not to exceed fifteen hours of credit have been earned.

An intensive study of a selected phase of English or American literature.

716. **Studies in Literary Theory.** Five credit hours. Winter Quarter. Given in alternate years. Mr. Percival.

A study of certain critical points of view, past and present, with practice in critical writing.

Not open to students who have credit for English 816.

*743. **Carlyle.** Five credit hours. Autumn Quarter. Given in alternate years. General prerequisites must include at least ten hours of courses in literature on the "600" level. Mr. Harrold.

Reading and investigation in Carlyle's writings, his ideas, and his methods, with special reference to his place in Victorian intellectual, social, and economic movements.

744. **Arnold.** Five credit hours. Autumn Quarter. Given in alternate years. General prerequisites must include ten hours of courses in literature on the "600" level. Mr. Derby.

Wide reading in the poetry and prose of Matthew Arnold, with a study of his background and his relation to both his own time and the Twentieth Century.

Not open to students who have credit for English 844.

*745. **Wordsworth.** Five credit hours. Spring Quarter. Given in alternate years. General prerequisites must include ten hours of courses in literature on the "600" level.

Wordsworth as the pivotal figure in the Romantic Movement, the social and political thought of his day, the story of his life, his relation to his contemporary writers, his philosophy of Man and Nature, and his place in literature as a poet and thinker.

Not open to students who have credit for English 845.

746. **Middle and Modern English.** Five credit hours. Winter Quarter. Given in alternate years. General prerequisites must include English 751. Mr. Utley.

A study of Middle English through close analysis of texts, and of some of the technics of linguistic research through a Middle English dialect report; the history of Modern English will then be studied from the basis provided by this analysis of the transitional period.

Not open to students who have credit for English 646.

750. **Master's Thesis.** Autumn, Winter, and Spring Quarters. Staff.

751. **Language and Literature of the Anglo-Saxons.** Five credit hours. Autumn Quarter. Given in alternate years. Mr. Estrich.

This course aims by a study of Old English literature to reveal the language patterns, social culture, and literary accomplishment of the earliest speakers of English.

Not open to students who have credit for English 651 or 830.

752. **Medieval English Literature.** Five credit hours. Spring Quarter. Given in alternate years. General prerequisites must include English 751 or 746; English 653 is recommended. Mr. Utley.
in alternate years. General prerequisites must include English 751 or 746; English 653 is recommended. Mr. Utley.

On the basis of close textual study of such major Fourteenth Century writings as *Pearl, Sir Gawain*, and *Piers Plowman*, this course treats the social backgrounds and literary traditions of the age of Chaucer and Wyclif.

Not open to students who have credit for English 654.

* Not given in 1946-1947.

† Not given during the academic year 1946-1947.

753. Chaucer. Five credit hours. Autumn Quarter. General prerequisites must include ten hours of courses in literature on the "600" level. Mr. Utley.

A close study of Chaucer's principal works and of the poet's development as artist in relation to his social and literary background.

Not open to students who have credit for English 653.

771. Donne and Other Metaphysical Poets. Five credit hours. Spring Quarter. Given in alternate years. General prerequisites must include ten hours of courses in literature on the "600" level. Mr. Parker.

A close study of significant verse of the early Seventeenth Century, designed for graduate students and for undergraduates with a special interest in poetry.

777. Elizabethan Drama. Five credit hours. Spring Quarter. Given in alternate years. Mr. Walley.

An intensive study of the origins, developments, and significance of the first great cycle of English theatrical history. Especially designed for graduate students and for advanced undergraduates with a specialized interest in the drama.

Not open to students who have credit for English 677.

NOTE: TEACHING COURSES. For the Teaching Courses in this department see the Department of Education, Courses 670 and 671.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46. Enrollment in these courses requires the approval of the student's graduate adviser.

*835-*836. Classic and Romantic. Five credit hours each Quarter. Winter and Spring Quarters. Given in alternate years. Permission of the instructor necessary. Mr. Percival.

A study of the classical ideal, critical and creative, of the early Eighteenth Century, followed by a study of the romantic ideal of the late Eighteenth and early Nineteenth Centuries.

837-838. Research in the Restoration Period. Five credit hours each Quarter. Winter and Spring Quarters. Given in alternate years. Permission of the instructor necessary. Mr. Wilson.

Individual research in Restoration Literature, Dryden to Pope; oral and written reports.

*842-*843. Studies in Victorian Literature. Five credit hours each Quarter. Winter and Spring. Four meetings each week. Given in alternate years. Mr. Harrold.

Problems and researches in the great Victorians in the light of their religious, philosophical, and social backgrounds.

865-866. Studies in American Literature and Cultural History. Five credit hours each Quarter. Autumn and Winter Quarters. Four meetings each week. Given in alternate years. Mr. Charvat.

Individual research in problems in American literature.

871-872. Studies in the Age of Milton. Five credit hours each Quarter. Autumn, Winter, and Spring Quarters. Given in alternate years. Permission of the instructor necessary. Mr. Parker.

Problems in Seventeenth Century research. Special attention to Milton's poetry and prose in relation to the cultural milieu of the period.

Not open to students who have credit for English 815.

*875-*876. Studies in the Age of Shakespeare. Five credit hours each Quarter. Autumn and Winter Quarters. Given in alternate years. Permission of the instructor necessary. Mr. Walley.

A study of the problems and materials of scholarship relating to Shakespeare and his theatrical and cultural environment. Individual research.

* Not given in 1946-1947.

880. Bibliography and Method. Five credit hours. Autumn Quarter. Permission of instructor necessary. Mr. Parker.

A course for the advanced graduate student in the methods and tools of documentary research.

***881. Textual Criticism and Editing.** Five credit hours. Spring Quarter. Given in alternate years. General prerequisites must include English 880. Miss Hughey.

Methods employed by representative scholarly editors of English literature; evaluation of selected editions; training in the skills requisite to the scholarly editor; paleography, usage of early printed books, collation, annotation; practice in textual editing.

950. Research in English. Autumn, Winter, and Spring Quarters.

This course is to be used only for dissertation registration of candidates for the degree of Doctor of Philosophy. The candidate should consult the adviser in charge of his major.

PUBLIC SPEAKING
(See Speech)

ENTOMOLOGY
(See Zoology and Entomology)

EUROPEAN HISTORY
(See History)

FARM CROPS
(See Agronomy)

FINE AND APPLIED ARTS
Office, 104 Hayes Hall

PROFESSORS HOPKINS, BAGGS, FANNING, A. ROBINSON, FREY, SHERMAN, ROOS, GRIMES, AND LITTLEFIELD, ASSOCIATE PROFESSORS BRADLEY, ATHERTON, RANNELLS, BATCHELDER, CHADEAYNE, GATRELL AND BOGATAY, ASSISTANT PROFESSORS FETZER, LANDACRE, AND H. ROBINSON.

Admission: For unconditional admission to graduate work in the Department of Fine Arts, prerequisites corresponding to Fine Arts 501-502-503, and technical courses in the related 600 groups or their equivalent should be offered.

Requirements for the degree of Master of Arts. For properly qualified students two curricula, technical and non-technical, are offered, each leading to the degree of Master of Arts. To receive this degree students must have at least a "B" average in forty-five credit hours of 600, 700, or 800 courses, as listed in the curricula below; must complete a satisfactory thesis as required for all candidates for the Master's degree; and must pass a comprehensive examination after the completion of course credit and the acceptance of the thesis. The thesis may be written in the historical or non-technical curriculum, or, in the technical curriculum, may consist of painting, sculpture, design, or ceramic work. In any case a written statement of the problems and solutions, with illustrations showing the results, is required.

CURRICULUM IN FINE ARTS
(TECHNICAL)

Fine Arts	(661) 5	Fine Arts	(662) 5	Fine Arts	(663) 5
Fine Arts	(801) 5	Fine Arts	(802) 5	Fine Arts	(803) 5
*Non-technical	5	*Non-technical	5	*Non-technical	5

***NOTE:** For non-technical credit, selection may be made from the following allied courses: Fine Arts 654, 670, 671, 672, 673, 674, 677, 680, 681, 682, 689, 804, 805, 806, or courses in history, literature, or philosophy approved by the adviser.

CURRICULUM IN FINE ARTS
(NON-TECHNICAL)

Fine Arts	(670) 2	Fine Arts	(672, 674 or 681) 2	Fine Arts	(654) 5
Fine Arts	(671) 3	Fine Arts	(682 or 673) 3	Fine Arts	(677) 3
Fine Arts	(801) 5	Fine Arts	(802) 5	Fine Arts	(803) 5
Fine Arts	(804) 5	Fine Arts	(805) 5	Fine Arts	(806) 5

With the consent of the adviser, substitution of other graduate subjects outside the School of Fine and Applied Arts may be made when the special interest of the student warrants it. For

* Not given in 1946-1947.

combination curricula the student should consult the School of Fine and Applied Arts in regard to proper sequence of courses. For technical credit (801-802-803) selection may be made from the following fields: drawing, design, painting, sculpture, ceramics.

The subject of the thesis, technical or non-technical, should be filed with the department before the second Quarter of graduate study. The faculty member under whom the major work of the student is done has charge of the thesis and should be consulted early in the program of study so that all courses may contribute to the preparation of the thesis.

Students whose general education, maturity, and experiences justify it may be admitted to courses without becoming candidates for the degree and pursue subjects for which they are qualified.

Requirements for the Degree Doctor of Philosophy: For students who have qualified for candidacy for the degree Doctor of Philosophy by satisfying scholastic and residence requirements (see page 42), and a dissertation may be offered in either technical or non-technical studies, its form being determined by the nature of the subject. For a technical thesis, such as a collection of paintings or work of sculpture, an accompanying manuscript with photographic records of the work is required.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

600. The Theory and Practice of Teaching Art. Five credit hours. Winter Quarter. Five periods each week with outside laboratory assignments, observations and required readings. Miss A. Robinson.

A course dealing with the teaching and supervision of art in the elementary, middle and high schools.

601. Introduction to Interior Decoration. Five credit hours. Autumn Quarter. Five three-hour periods each week. Lectures and laboratory.

General survey of period and contemporary styles of significance in interior decoration. Laboratory practice in the use of styles in relation to architectural setting.

Individual and group problems which require a thorough knowledge of particular styles. Emphasis is placed on design and organization. Presentations are made with models, elevation and perspective drawings. Museum and commercial research is included.

625. Advanced Life Drawing. Five credit hours. One Quarter. Autumn, Winter, Spring. General prerequisites must include a course in drawing from life. Mr. Sherman, Mr. Chadeayne.

Advanced problems in drawing from life and figure composition.

†630. Advanced Water Color Painting. Three credit hours. Mr. Grimes.

Painting from still life, models, and landscapes. Special problems in organization and development of pictures. This course is particularly suited to graduate students who plan to present a thesis in water color painting.

Not open to students who have credit for Fine Arts 380.

645-646-647. Portrait Painting. Five credit hours. Autumn, Winter, and Spring Quarters. Five three-hour periods each week. Mr. Hopkins.

Painting from life. The organization and development of pictures with special reference to the delineation of character.

650. Methods and Materials of the Painter. Three credit hours. Autumn Quarter. General prerequisites must include Fine Arts 645-646-647. Mr. Grimes.

A study of painting materials, the composition of pigments, binders, and varnishes. A review of ancient methods of painting with a consideration of their possibilities for contemporary use. Egg tempera, varnish tempera, under-painting, and oil glazes. Laboratory practice and lectures.

654. History of Renaissance Art. Five credit hours. Spring Quarter. Five lectures each week. Mr. Fanning.

The study of the Renaissance movement in Italy as reflected in architecture, painting, and sculpture; its influence upon other countries and its relationship to the intellectual trend from the Fifteenth to the Nineteenth Century.

† Not given during the academic year, 1946-1947.

*656. **History of Oriental Art.** Five credit hours. Winter Quarter. Five lectures each week. Mr. Fanning.

The study of Asiatic culture expressed by the historical development of architecture, sculpture, and painting in Persia, India, China, and Japan. Illustrated lectures, reading, and reports.

661-662-663. **Technical Problems.** Three to five credit hours. Enrollment in these numbers may be continued up to a total of fifteen hours each. Autumn, Winter, and Spring Quarters. Open by permission of the department to students in technical fields who have completed the other laboratory courses in their areas and who wish an opportunity for further research in specialized problems.

(a) Water color painting. Miss Bradley, Mr. Fanning, Mr. Grimes.
(b) Oil painting. Mr. Grimes, Mr. Hopkins.
(c) Life drawing. Mr. Sherman, Mr. Chadeayne.
(d) Sculpture. Mr. Frey.
(e) Ceramics. Mr. Baggs, Mr. Atherton, Mrs. Fetzer.
(f) Design. Mr. Rannells, Miss Bradley, Mr. Bogatay, Miss Betchelder.
(g) Art Education. Miss A. Robinson.
(h) History. Mr. Fanning, Mr. Roos.

*670. **History of the Art of Ancient Egypt, Mesopotamia, and Iran.** Two credit hours. Autumn Quarter. Mr. Fanning.

The specialized study of the ancient arts of the valleys of the Nile and Tigris-Euphrates and their influence upon eastern Mediterranean culture including Ancient Persia. Lectures, discussions, and presentation by each student of some special problem of research.

671. **History of Hellenic Art.** Three credit hours. Autumn Quarter. Mr. Fanning.

The specialized study of Greek architecture, sculpture, and painting. Lectures, round table discussions and presentation by each student of some special problem of research.

672. **History of Islamic Art.** Two credit hours. Winter Quarter. Alternating with Fine Arts 674. Mr. Fanning.

The study of Moslem architecture and minor arts with special attention to origins and influences. Lectures, reading, and reports.

673. **History of Christian Art of the Middle Ages.** Three credit hours. Winter Quarter. Mr. Roos.

The specialized study of various phases of Romanesque and Gothic art as an expression of medieval Christianity in Italy, France, Germany, Spain, and England. Lectures, reading, discussions, and reports on research topics.

*674. **History of Spanish Art.** Two credit hours. Winter Quarter. Alternating with Fine Arts 672. Mr. Fanning.

The study of the architecture, sculpture, painting, and minor arts of Spain and the countries under Spanish influence. Lectures and reports.

*675. **History of Latin-American Art.** Five credit hours. Winter Quarter. Mr. Fanning.

History of the architecture, sculpture, painting and related arts of Mexico, and the Central and South American countries, from Pre-Columbian times to the present. The successive Mayan, Toltec, Incan, Aztec and transported European civilizations will be considered in the relation to the environmental, religious, political and economic factors that influenced them.

*677. **History of French Art from the Beginning of the Seventeenth Century to the Present Day.** Three credit hours. Spring Quarter. Reading knowledge of French desirable.

A specialized study of the architecture, sculpture, and painting of modern France. Illustrated lectures, reading, and reports.

*680. **History of Art in Germany and the Low Countries.** Three credit hours. Spring Quarter. Reading knowledge of German desirable.

A specialized study of the architecture, sculpture, and paintings of the Germanic people and their relationship to social and political development. Lectures, reading, and reports.

* Not given in 1946-1947.

681. History of English Art. Three credit hours. Autumn Quarter. Mr. Roos.

A study of the work of outstanding architects, painters, and sculptors in England as an index of the artistic trend since the beginning of the Sixteenth Century. Illustrated lectures, reading, and reports.

682. History of American Art. Five credit hours. Winter Quarter. Mr. Roos.

A study of architecture, painting, and sculpture in America during the Eighteenth, Nineteenth, and Twentieth Centuries. Illustrated lectures, reading, and reports.

†689. Contemporary Art. Three credit hours. Autumn Quarter. Three lectures each week. Mr. Roos.

The chronological development of artistic styles in Europe and America since the Industrial Revolution. Effects on present day art of significant movements.

701-702-703. Minor Problems. Three to five credit hours. Autumn, Winter, Spring Quarters. Mr. Hopkins, Miss Bradley, Mr. Grimes, Mr. Sherman, Mr. Baggs, Mr. Frey, Mr. Fanning, Mr. Roos, Mr. Bogatay, Mr. Atherton.

Open, by permission of the department, to graduate students who are qualified to do original work in painting, sculpture, or ceramics, history or design.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

801-802-803. Major Technical Problems. Three to five credit hours. Enrollments in these numbers may be continued up to a total of fifteen hours each. Autumn, Winter, and Spring Quarters. Mr. Hopkins, Mr. Fanning, Mr. Frey, Mr. Grimes, Mr. Baggs, Mr. Atherton.

This course is open, by permission of the department, to graduate students who are qualified to do original work in ceramics, painting, or sculpture.

804-805-806. Major Historical Problems. Three to five credit hours. Enrollments in these numbers may be continued up to a total of fifteen hours each. Autumn, Winter, and Spring Quarters. Mr. Fanning, Mr. Baggs, Mr. Roos.

This course is open, by permission of the department, to graduate students who are qualified to do original research in the history of fine arts.

950. Research in Fine Arts. Autumn, Winter, and Spring Quarters. Library, conference, and laboratory work. General prerequisites must include acceptable courses in the chosen field of research. The student may spend a part or all of his time on research work. Mr. Hopkins, Mr. Baggs, Mr. Fanning, Mr. Frey, Mr. Roos.

FRENCH

(See Romance Languages and Literatures)

GENETICS

Graduate work in genetics is offered by several departments. Fundamental and theoretical genetics is handled by the Department of Zoology and Entomology, where the Ph.D. degree with specialization in genetics is offered. Practical work in genetics is given by the various specialized departments such as Agronomy, Animal Husbandry, Horticulture and Poultry Husbandry.

† Not given during the academic year, 1946-1947.

The following courses in genetics are available to graduate students, and their descriptions should be consulted under the offerings of the several departments:

Zoology 601	Advanced Human Heredity
Zoology 602	Advanced Genetics
Zoology 618	The Cytological Basis of Genetics
Agronomy 607	Field Crop Breeding
Animal Husbandry 611	Advanced Live Stock Breeding
Botany 635	Plant Genetics
Botany 637	Plant Cytology
Horticulture 601	Horticulture Plant Breeding
Poultry Husbandry 606	Poultry Genetics

Special problems (701) and research (950) in genetics are offered in several of these departments, particularly in the Department of Zoology and Entomology. A non-credit seminar in genetics is held each Friday at four during the school year in the Department of Zoology and Entomology.

GEOGRAPHY

Office, 213 Commerce Building

PROFESSORS SMITH, VAN CLEEF, PEATTIE, AND CARLSON, ASSOCIATE PROFESSORS WRIGHT, ASSISTANT PROFESSOR McCUNE, MR. HAWKES

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

603. The Localization of Manufacturing Industries. Three credit hours. Spring Quarter. Three class meetings each week. General prerequisites must include elementary courses in geography or in economics. Mr. Wright.

The geography of manufacturing, particularly American industries. Industrial districts. Special study of representative industries as to: labor supply; sources, quantity, and value of material and power used; transportation facilities available; quantity and value of products; and problems of competition and markets.

604. Conservation of Natural Resources. Three credit hours. Autumn Quarter. Three class meetings each week. General prerequisites must include elementary courses in geography or fifteen hours of allied subjects. Mr. Wright.

The importance of our natural resources. The need for their conservation. Land as a natural resource and economic factor. Character and location as factors in land utilization and value. Regional and national planning for resource utilization.

605. Geography of Ohio. Two credit hours. Winter Quarter. Two class meetings each week. General prerequisites must include elementary courses in geography or fifteen hours of allied subjects. Mr. Wright.

Geographic influences in the history of the state. Ohio's agriculture, industries, and social conditions, together with the underlying physical, climatic, and other environmental factors that have contributed to the present development of the region.

611. Cartography and Map Interpretation. Three credit hours. Winter Quarter. Three class meetings each week. General prerequisites must include elementary courses in geography or ten hours of allied subjects. Mr. Smith.

The interpretation and appreciation of maps. A consideration of scales, symbols, and the common map projections. The representation of geographic data by the use of dots, isopleths, cartograms, and other graphic devices. A survey of the various maps published by the United States and other map-issuing institutions.

615. Climatology. Four credit hours. Autumn Quarter. Four class meetings each week. General prerequisites must include fifteen hours in natural or social science, including courses in one of the following: geography, meteorology, botany, or agronomy. Mr. Smith.

Elements of climate and their distribution. The controls of climate. Types of climate and their distribution with particular reference to agricultural production, natural vegetation

and the major soil groups. Concluded by a consideration of the recent thought on the subject of climatic regions and their boundaries.

621. Geography of Europe. Three credit hours. Autumn Quarter. Three class meetings each week. General prerequisites must include elementary courses in geography. Open to graduate students majoring in economics, history, political science, or other closely related fields with permission of the department. Mr. Van Cleef.

The geographic factor in the economic, social, and political progress of the nations. Current major problems of the continent in the light of their geographic background. Consideration given to some geopolitical problems

624. Geography of Latin America. Three credit hours. Winter Quarter. Three class meetings each week. General prerequisites must include elementary courses in geography. Open to graduate students majoring in economics, history, political science, or other closely related fields with permission of the department. Mr. Carlson.

Geographic regions of Mexico, Central America, the West Indies, and South America. The development of the political divisions in relation to their geographic conditions. Special emphasis is placed on the geographic analysis of Inter-American affairs.

625. Geography of the Far East. Three credit hours. Spring Quarter. Three class meetings each week. General prerequisites must include elementary courses in geography. Open to graduate students majoring in economics, history, political science, or other closely related fields with permission of the department. Mr. McCune.

The geographic character of the continent of Asia. The regional divisions of the monsoon lands of the Far East and India. The major activities of the people of the regions of densest population and greatest economic importance.

631. The Historical Geography of Commerce. Three credit hours. One Quarter. Autumn and Spring. Three class meetings each week. General prerequisites must include elementary courses in geography or in history. Mr. Peattie.

Geographic factors in commerce to 1800. Resources and production in the ancient and medieval world. Trade routes in relation to exchange of ideas. Geographic elements in the early origin of many present-day commercial practices.

633. The Geography of Modern Commerce. Three credit hours. Autumn Quarter. Three class meetings each week. General prerequisites must include elementary courses in geography. Mr. Carlson.

Unequal distribution of natural resources and differences in industrial and social development as basic factors in interregional trade. A consideration of the major raw materials and other important commodities in international commerce. Geographic factors in the establishment and development of trade routes. Concluded with a discussion of major trade areas.

634. Geography of Cities. Three credit hours. One Quarter. Winter and Spring. Three class meetings each week. General prerequisites must include elementary courses in geography. Mr. Van Cleef.

Geographic factors in the origin and growth of urban centers. Analysis and synthesis of the economic and physical structure and functions of trade centers in the light of their geographic setting; areal expansion; intra- and inter-trade center relations; integration with avenues of communication; city planning.

651. The Geographic Factor in Cultural Evolution. Three credit hours. Winter Quarter. Three class meetings each week. General prerequisites must include courses in elementary geography or history. Mr. Peattie.

An advanced course in cultural geography. A consideration of geographic provincialisms with particular reference to cultural differentiation in North America. Regionalism as expressed in politics, literature and the arts. A critical examination of the theory of environmentalism.

***700. Field Work in Geography.** Two credit hours. Spring Quarter. General prerequisites must include twelve hours of geography. Given in alternate years. Mr. Smith.

A course in the practice of field observation and geographic mapping.

* Not given in 1946-1947.

712. Political Geography. Three credit hours. Winter Quarter. Three class meetings each week. General prerequisites must include fifteen hours of political science including Political Science 613, or thirteen hours of geography.

The geographical characteristics of political areas. A consideration of size, shape, frontiers, resources and technological advancement in relation to economic and political strength. Land power versus sea power. Buffer states. Geographical aspects of colonialism. The geographical factors in geopolitics. Special attention will be given to selected areas and problems of historical and current importance.

799. Special Problems in Geography. Two to five credit hours. Autumn, Winter, and Spring Quarters. Assigned readings, conferences, and reports. General prerequisites must include eighteen hours of geography and consent of the instructor must be obtained.

(a) Problems in Physical Geography. Mr. Smith, Mr. Peattie, Mr. Carlson.
(b) Problems in Climatology. Mr. Smith, Mr. McCune.
(c) Problems in Political and Historical Geography. Mr. Smith, Mr. Peattie, Mr. Van Cleef.
(d) Problems in Economic and Commercial Geography. Mr. Van Cleef, Mr. Carlson, Mr. Wright, Mr. McCune.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

811. History of Geography. Three credit hours. Spring Quarter. Three class meetings each week. General prerequisites must include eighteen hours of geography. Given in alternate years. Mr. Van Cleef, Mr. Peattie.

Readings in the classics. The history of the development of geographic theories. Modern tendencies as seen in current literature.

850. Seminar in Geography. Two credit hours. Not more than two seminars to be given each Quarter. Subject to be announced each Quarter.

950. Research in Geography. Autumn, Winter, and Spring Quarters.

Research work in historical and political geography will be conducted under the direction of Mr. Peattie; in geography of conservation and land utilization under the direction of Mr. Wright; in physical geography and climatology under the direction of Mr. Peattie and Mr. Smith; in commercial and urban geography under the direction of Mr. Van Cleef.

Conference, assigned problems, and reports.

GEOLOGY†

Offices, 103, 104 Orton Hall

PROFESSORS SPIEKER, CARMAN, AND WHITE, ASSOCIATE PROFESSORS STEWART, LAMEY AND WELLS, MR. STOUT

Prerequisites for Graduate Work: Students intending to take graduate work in geology should preferably have made geology a major undergraduate study, and in any event should have completed at least thirty Quarter hours (twenty semester hours) of work in geology and mineralogy, with supporting work in chemistry and mathematics (at least through trigonometry), and, if possible, in physics and biology also.

Students whose training falls short of these specifications are not debarred from entrance into graduate work, but the time spent making up deficiencies cannot normally be accredited as work done toward the graduate degree.

All candidates for advanced degrees must have had field experience at least equivalent to that afforded by the field course offered by this department. Entering students who lack such experience are urged to take Geology 627 or its equivalent elsewhere during the summer preceding entrance into the regular academic year.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

601. Advanced General Geology: Geomorphology. Five credit hours. Au- week. Saturdays must be kept open for field trips. General prerequisites must include elementary courses in geology or geography.

A detailed study of the processes at work on the land surface and the topographic forms produced by them. This course includes practice in the interpretation of topographic maps.

† For courses in mineralogy and petrography see the Department of Mineralogy.

602. Advanced General Geology: Structural and Dynamic. Five credit hours. Winter Quarter. Four class meetings and one two-hour laboratory period each week. General prerequisites must include Geology 601. Mr. Spieker.

A detailed study of the structural features of the earth's crust and of the forces which have produced these structures. This course includes practice in the interpretation of geological maps and in various measurements and computations.

603. Advanced General Geology: Historical. Five credit hours. Spring Quarter. Four class meetings and one two-hour laboratory period each week. Saturday mornings must be kept open for field trips. General prerequisites must include Geology 602. Mr. Carman, Miss Stewart.

A study of the geological history of North America, its physical history, and life development. The course deals with the classification and distribution of the geological formations, especially those of Ohio, and with the characteristic fossils of each system.

605. Economic Geology: Metals. Five credit hours. Autumn Quarter. Four class meetings and one two-hour laboratory period each week. General prerequisites must include elementary courses in mineralogy. Mr. Lamey, Mr. White.

A study of the nature of ores, their classification and origin; the metallic deposits.

606. Economic Geology: Non-Metals and Coals. Three credit hours. Winter Quarter. Three class meetings or lectures each week. General prerequisites must include elementary courses in mineralogy. Mr. White.

A study of non-metallic materials except petroleum. Origin, properties, classification, and distribution of the industrial minerals and rocks, and coal, with special emphasis on the coals of Ohio.

607. Economic Geology: Petroleum. Five credit hours. Spring Quarter. Four class meetings and one two-hour laboratory period each week. General prerequisites must include four Quarters of geology or of geology and mineralogy. Mr. White, Mr. Lamey.

A study of the origin, geologic occurrence, and distribution of petroleum, natural gas, and the solid bitumens.

608. Stratigraphic Geology of Ohio. Five credit hours. Autumn Quarter. Given in alternate years. Permission of the instructor must be obtained. Mr. Carman.

Field trips with reports, lectures, and assigned readings. Field trips on Saturdays (entire day) while the weather permits.

The geological formations of Ohio are studied in the field, by rock specimens, and by assigned readings. This course is intended to acquaint the student with the rock formations of Ohio.

*609. Petrology. Five credit hours. Winter Quarter. Five class meetings and one two-hour laboratory period each week. Given in alternate years. General prerequisites must include elementary courses in mineralogy. Mr. Lamey.

A study of the occurrence, association, chemical relationships, and distribution of rocks, with laboratory study in rock identification.

610. Physiography of the United States. Five credit hours. Winter Quarter. Five class meetings each week. Given in alternate years. General prerequisites must include Geology 601. Mr. Cole.

A study of the physiographic regions of the United States. The topographic form and physiographic history with the geologic history as a background. Designed to give the student of geology or geography a working knowledge of the physiography of the United States.

612. Special Problems. Three to five credit hours. All Quarters. Assigned readings, conferences, and reports.

A study of special topics by conferences and reports. Laboratory, library or field work.

Properly qualified students may carry on work in stratigraphy, sedimentation, structural geology, economic geology, petrology, opaque ore mineral studies, paleontology and physiography under the direction of the appropriate members of the department.

* Not given in 1946-1947.

613. Glacial Geology. Three credit hours. Autumn Quarter. Certain Saturdays must be kept open for field trips. Given in alternate years. General prerequisites must include elementary courses in geology and preferably Geology 601. Mr. Cole.

A study of the glacial geology of North America, with special emphasis on the glacial problems of Ohio.

615. Geological Surveying. Five credit hours. Spring Quarter. Three class meetings and two field or laboratory periods each week. Given in alternate years. Permission of the instructor must be obtained. Class limited to ten. Mr. Spieker.

A study of the fundamental techniques used in mapping, with special emphasis on the geologic map and its ideal base, the topographic map. Field practice in the most effective methods of triangulation, traverse, and the sketching of contours and geologic contacts. All standard instruments are used, and some introduction is given to photogrammetric methods and other use of aerial photographs.

***616. Clays.** Five credit hours. Winter Quarter. Five class meetings each week. General prerequisites must include a course in chemistry. Mr. Stout.

The properties, distribution, uses, and origin of clays. Emphasis will be given to the clays of Ohio.

620. Introductory Paleontology. Three credit hours. Autumn Quarter. Two class meetings and one two-hour laboratory period each week. General prerequisites must include a course in historical geology. Mr. Carman, Miss Stewart.

A study of the systematic classification of the animal kingdom as a means of becoming acquainted with the faunas that characterize the various geological formations. The course deals mainly with the generic characters of the fossil invertebrates and their use in identifying and correlating geological formations.

621. Introductory Paleontology. Three credit hours. Winter Quarter. Mr. Carman, Miss Stewart.

A continuation of Geology 620.

622. Introductory Paleontology. Three credit hours. Spring Quarter. Mr. Wells, Mr. Carman.

A continuation of Geology 621 but deals with the paleontology and paleoecology of fossil plants and vertebrates.

***623. Micro-Paleontology.** Three credit hours. Spring Quarter. Laboratory work conducted by conference. Given in alternate years. General prerequisites must include Geology 620-621. Miss Stewart.

A study of fossil microorganisms, especially the foraminifera. The course is designed to give a general knowledge of the structure, habits, taxonomic relationships, and phylogenetic development of these organisms. Methods of study commonly practiced in commercial laboratories, and the use of microorganisms in determining geologic correlation, especially in oil drillings, are stressed in the laboratory work.

627. Field Geology. Eight credit hours. Summer Quarter. First term. General prerequisites must include Geology 601-602-603 or equivalent. Permission of the instructor must be obtained. Mr. Spieker.
Spieker.

This course provides training in the fundamental methods of geologic observation and mapping in the field. It begins about June 20 and occupies the entire time of the students for five weeks. In 1947 and thereafter, it will probably be conducted in a part of the Cordilleran region selected for excellence and variety of geologic phenomena. All applicants must make special arrangement with the instructor as early as possible.

* Not given in 1946-1947.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

If the student intends to specialize in paleontology he must have had in addition courses in zoology; if in inorganic geology, courses in chemistry, physics and mineralogy; if in physiography, courses in physics, chemistry, and geography.

801-802-803. Advanced Historical Geology. Three credit hours. Autumn, Winter, and Spring Quarters. Three lectures each week. Given in alternate years. Mr. Carman, Mr. Spieker.

A study of the physical history of the North American continent and of the life development which has taken place upon it. The lithology, subdivisions, geographical distribution, and fossils of each system are studied and from these the geological history of the time is interpreted.

807. Advanced Paleontology. Three or four credit hours each Quarter. Autumn, Winter, Spring. Individual laboratory work conducted by conference. A student may enter at the beginning of any Quarter. General prerequisites must include Geology 620, 621, and 622. Miss Stewart, Mr. Wells.

The identification and study of typical faunas from various geologic formations, with particular reference to those of Ohio.

*810. Geology of the Eastern United States. Three credit hours. Winter Quarter. Lectures, readings, conferences. Given in alternate years. General prerequisites must include acceptable courses in historical and structural geology. Mr. Carman.

A review of the important stratigraphic and structural features of the Eastern United States. Special attention is given to the correlation of the important formations, the major structures and the paleogeography of the region.

*811. Geology of the Western United States. Three credit hours. Spring Quarter. Lectures, readings, conferences. Given in alternate years. General prerequisites must include acceptable courses in historical and structural geology. Mr. Spieker.

A review of the important stratigraphic and structural features of the Western United States, as exemplified by the Cordilleran region. Special attention is given to the correlation of the important formations, the major structures, and the paleogeography.

*812. Principles of Sedimentation and Stratigraphy. Three credit hours. Spring Quarter. Three lectures each week. Given in alternate years. General prerequisites must include courses in advanced general geology. Mr. Spieker.

The origin, constitution, and relationships of stratified rocks; an approach to the outstanding problems of stratigraphy, in which attention is given chiefly to processes of sedimentation and their results, the interpretative study of sedimentary rocks, and the general problems of correlation.

Not open to students who have credit for Geology 618.

813. Sedimentary Petrography I. Three credit hours. Spring Quarter. One lecture and six hours of laboratory work each week. Given in alternate years. General prerequisites must include courses in advanced general geology. Mr. Spieker.

The theory and application of various techniques in the laboratory study of sediments and sedimentary rocks. Mechanical analysis, determination of fundamental physical characters of sedimentary materials. Statistical procedures for representation of results. The problem of interpretation; possible uses of the various laboratory data in determining conditions of origin and in other concerns of the stratigrapher such as correlation.

*814. Sedimentary Petrography II. Three credit hours. Spring Quarter. Nine hours of laboratory work each week. Given in alternate years. General prerequisites must include Mineralogy 621 or its equivalent. Mr. Lamey.

Laboatory preparation of clastic sedimentary rocks for microscopic examination, the microscopic study of the component fractions of such rocks, and the interpretation of results.

* Not given in 1946-1947.

815. Seminar in Metamorphism. Two credit hours. Autumn Quarter. General prerequisites must include Geology 609. Mr. Lamey.

A study of the processes of metamorphism, with a critical analysis of the rock types produced.

816. Seminar in Structural Geology. Two credit hours. Winter Quarter. Mr. Spieker.

Conferences for the discussion of problems in geologic structure as exemplified and developed in selected mountain regions.

817. Seminar in Earth Tectonics. Two credit hours. Spring Quarter. Mr. Spieker.

Conferences covering the broader and more fundamental problems of earth structure, involving chiefly the nature and origin of crustal forces.

950. Research in Geology. Autumn, Winter, and Spring Quarters. Field, laboratory and library study. General prerequisites must include acceptable courses in the field chosen. Consent of the instructor must be obtained.

Research in stratigraphy and structural geology is conducted under the supervision of Mr. Carman, Mr. Spieker, and Mr. White; in paleontology under Mr. Carman, Miss Stewart and Mr. Wells; in sedimentation under Mr. Spieker; in economic geology and petrology under Mr. Lamey, and in geomorphology under Mr. Cole.

GERMAN

Office, 213 Derby Hall

PROFESSORS BLUME, EVANS (EMERITUS), EISENLOHR (EMERITUS), MAHR, AND SPERBER, ASSOCIATE PROFESSORS GAUSEWITZ, NORDSIECK, AND KRAMER

Prerequisites for Graduate Work: Candidates for advanced degrees must present on admission to the graduate field an undergraduate major in German from a recognized college or its equivalent.

Requirements for the Master's Degree: Generally speaking one full year will suffice for the Master's degree, but each case will be considered individually by the department. At least fifteen hours in 800 courses will be required and about one-half of the work divided between linguistic and advanced practice courses. Wide reading in classical and modern literature is essential.

Requirements for Ph.D. Degree: For the doctorate the major may be selected from the literary or the linguistic field, with about two-thirds of the work assigned to the major field and one-third to the minor.

Candidates for the doctorate in German must present a knowledge of a Romance language which is the equivalent of at least two courses in the "600" group, or a working knowledge of either Latin or Greek.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

LITERATURE

The courses in literature are presented below in a two-year cycle, except for the Survey of German Literature which is given annually.

1946-1947:

611. German Literature of the Eighteenth Century. Three credit hours. Autumn Quarter. Mr. Gausewitz.

A study of the rise of Enlightenment in Germany, with special emphasis on Lessing and Schiller.

612. Goethe's Faust. Three credit hours. Winter Quarter. Mr. Mahr.

The history of the Faust legend from the sixteenth century to Goethe. Reading and discussion of the drama.

613. Goethe's Life and Works. Three credit hours. Spring Quarter. Mr. Blume.

The development of Goethe's art and personality. His significance for modern times.

1947-1948:

614. German Romanticism. Three credit hours. Autumn Quarter.

The romantic revolt against the ideals of classical humanism. Novalis, the Schlegels, Tieck, Kleist, Eichendorff, E. T. A. Hoffman.

615. German Literature of the Nineteenth Century. Three credit hours. Winter Quarter.

Social and literary forces in Germany from the death of Goethe to the founding of the German Reich.

616. Contemporary German Literature. Three credit hours. Spring Quarter.

The main currents of German thought and literature from Nietzsche to the present. Special emphasis on Hauptmann, Rilke and Thomas Mann.

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617. Survey of German Literature. Three credit hours. Spring Quarter. Mr. Kramer.

An historical survey of German literature from Luther to the present, especially for majors in the senior year.

LINGUISTICS

656. Introduction to the Historical Study of German. Three credit hours. Autumn Quarter. Three hours lecture and drill each week. General prerequisites must include six Quarters of German or equivalent. Mr. Sperber.

Elements of phonetics. Relations between German and English phonology. Survey of the history of the German language.

673. Elementary Middle High German. Three credit hours. Spring Quarter. Mr. Fleischhauer.

Introduction to the study of Middle High German with the reading of easy texts.

675. Elements of German Semantics. Three credit hours. Winter Quarter. Three hours lecture and quiz each week. Mr. Sperber.

Studies in German words and the development of their meaning.

705. Principles of the Historical Study of Language. Three credit hours. Spring Quarter. Three lectures each week. Mr. Sperber.

The elements of linguistic science, together with an outline of the Indo-European family of languages.

Not open to students who have credit for Greek 701.

PRACTICE

685. Advanced Composition. Three credit hours. Spring Quarter. Three hours lecture and quiz each week. General prerequisites must include at least six Quarters of German. Mr. Kramer.

An advanced course in speaking and writing German, accompanied by a review of German syntax.

***691. Practical German Pronunciation.** Two credit hours. Winter Quarter. Two hours lecture and drill each week. General prerequisites must include six Quarters of German or equivalent. Mr. Kramer.

The formation of German sounds. A systematic study of the standard of German pronunciation and its chief variations. Oral and written drill. For majors, especially those who expect to teach the language.

* Not given in 1946-1947.

INDEPENDENT STUDY

701. Minor Problems. Two to ten credit hours. Autumn, Winter, Spring. Open only on permission of the department. Mr. Blume, Mr. Mahr, Mr. Sperber, Mr. Gausewitz, Mr. Kramer, Mr. Nordsieck, Mr. Fleischhauer, Mr. Weinberger.
Investigation of minor problems in the various fields of German literature and philosophy.

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Education, Course 690.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

***801. Advanced Middle High German.** Three credit hours. Autumn Quarter. Mr. Sperber.
The reading of more difficult Middle High German texts. Methods of textual criticism.

***805. Gothic and Old High German I.** Three credit hours. Spring Quarter. Mr. Sperber.

***810. Gothic and Old High German II.** Three credit hours. Spring Quarter. Mr. Sperber.

821-822-823. History of German Literature. Three credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include graduate standing. Mr. Nordsieck.
This course is intended primarily to afford first-year graduate students an opportunity for wide reading in the general field of German literature or for intensive reading in specific periods. Informal discussion and written reports.
Not open to students who have credit for German 601-602-603.

860. Seminar in German Literature. Five credit hours. Autumn, Winter, and Spring Quarters. The courses are presented below in a three-year cycle.

1946-1947:

Autumn Quarter. The German Novelle. Mr. Gausewitz.
Winter Quarter. History of the Novel. Mr. Mahr.
Spring Quarter. Goethe and Schiller. Mr. Blume.

1947-1948:

Autumn Quarter. Drama of the Classical Period and Romanticism. Mr. Gausewitz.
Winter Quarter. Drama of the Nineteenth Century. Mr. Mahr.
Spring Quarter. Drama of the Twentieth Century. Mr. Blume.

1948-1949:

Autumn Quarter. Rilke. Mr. Blume.
Winter Quarter. Lessing. Mr. Kramer.
Spring Quarter. Sturm und Drang. Mr. Mahr.

870. Seminar in German Linguistics. Three credit hours. Autumn, Winter, and Spring Quarters. Mr. Sperber.
Ausgewählte Gegenstände aus den Gebieten der Wortgeschichte, der Stilforschung und der Sprachpsychologie.

950. Research in German. Autumn, Winter, and Spring Quarters. Mr. Blume, Mr. Mahr, Mr. Sperber, Mr. Gausewitz, Mr. Kramer.

GREEK LANGUAGE AND LITERATURE

(See Classical Languages and Literature)

* Not given in 1946-1947.

HISTORY

Office, 211 University Hall

PROFESSORS WASHBURNE, SIEBERT (EMERITUS), McNEAL (EMERITUS) HOCKETT (EMERITUS), HILL, DORN, McDONALD, WOODRING, AND DULLES, ASSOCIATE PROFESSORS ROSEBOOM, WEISENBURGER, SIMMS, AND GRIMM, ASSISTANT PROFESSORS HARE, LANDIN, FISHER, POMEROY, MORLEY, AND TERR

Requirements for the Master's Degree: In addition to the general requirements, the Department of History requests that each candidate for the degree Master of Arts should have History 812 or its equivalent and two seminars in history.

DEPARTMENTAL REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

A. Notice of Candidacy. Students who expect to become candidates for the degree of Doctor of Philosophy should make known their intentions not later than the beginning of the first Quarter of the second year of graduate work.

From the list below, each student will select and enter upon an application form which may be obtained from the office of the department, five fields of history and one field of allied knowledge. Three of the history fields must be selected from Group A and two from Group B or three may be selected from Group B and the other two from Group A. One of the fields of history shall be designated as the dissertation field. The sixth field must be selected from Group C.

B. Fields of Choice:

GROUP A

Ancient Near East and Greece
Roman History
Medieval History
Era of the Renaissance and Reformation
Era of the Absolute Monarchy and French Revolution
Europe since 1815
European Diplomacy since 1878
England to 1603
England and Greater Britain since 1603
Expansion of Europe

GROUP B

Colonial Era of the Western Hemisphere
Political and Social History of the United States through the Civil War
Political and Social History of the United States since the Civil War
Slavery Controversy and Post-Bellum South
Constitutional History of England and the United States
Greater Republics of Latin America
American Foreign Relations

GROUP C

An approved field in anthropology, economics, political science, philosophy, literature, or other allied subject

C. Foreign Languages. Except in special cases, a reading knowledge of French and German is required of every candidate for the degree of Doctor of Philosophy in history. In special cases, the department may consent to the substitution of another language for French or German. In such cases the language selected as a substitute must have a clear bearing upon the candidate's field of research.

D. The General Examination. The candidate will be required to take examinations in all five of the selected fields of history and in the allied field. All candidates for the degree of Doctor of Philosophy are required to have had History 812 or its equivalent, and are required to take History 813 and History 814, and at least four seminars in history, of which two must be in the field of European history and two in the field of American history.

Candidates for the Doctor of Philosophy degree in history should read the general requirements for this degree as given on page 42.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

These prerequisites include at least four Quarter courses in the social science field, of which at least two must be in history.

See page 63 for the program in Ancient History and Literature.

607. The Renaissance. Three credit hours. Autumn Quarter. Mr. Grimm.

The Renaissance primarily as an Italian movement. The political evolution of the Italian communes into city republics, with special emphasis on Florence, Milan, Venice, Genoa, and

Rome; early capitalism and industrial and commercial movements; an analysis of the culture, art, science, and literature of the Renaissance and their influence upon the Church, the Papacy, and modern modes of thought and behavior. Lectures, readings, reports, and discussions.

608. **The Reformation.** Three credit hours. Spring Quarter. Mr. Grimm.

The Church and European society in the later Middle Ages; culture and thought in the age of the Reformation; the rise of the European state system; Luther and the German National movement; Zwingli and Switzerland; Calvin; the expansion of Protestantism in Europe; and the relation of the Reformation to medieval and modern civilization. Lectures, readings, reports.

611. **Constitutional History of England (to 1485).** Three credit hours. Winter Quarter. General prerequisites must include History 682 or consent of the instructor. Mr. Woodring.

The development of an effective royal administration, rise of common law and system of courts, dawn of representative institutions, completion of basic institutions and tradition of constitution by 1485. Lectures, textbook, source problems, collateral readings.

612. **Constitutional History of England (since 1485).** Three credit hours. Spring Quarter. General prerequisites must include History 611 or consent of the instructor. Mr. Woodring.

The Tudor system, the struggle between king and parliament, cabinet government, electoral reform, and the law of the modern constitution. Lectures, textbook, source problems, collateral readings.

617. **The Age of Enlightenment (1650-1789).** Three credit hours. Spring Quarter. Mr. Grimm.

This course offers a study of the transformation of feudal society into the modern absolute state in its social, economic and constitutional aspects, as exemplified in France, Spain, Austria, Prussia, and Russia. Special emphasis will be placed on France under Louis XIV, on the evolution of Prussia and Russia, the changing diplomatic alignments of the principal European Powers from 1660 to 1789, on the intellectual enlightenment of the eighteenth century and Enlightened Despotism. Readings, discussions, and reports.

619. **Medieval Civilization.** Three credit hours. Autumn Quarter. General prerequisites must include a major in history. Advanced students from other departments without this prerequisite admitted only with consent of the instructor. Mr. Grimm.

The formation of feudal society; culture of castle and court; the rise of towns and their social and economic life; the evolution of the Medieval Church and its educational and artistic contributions. Lectures, readings, problems, and class discussion.

621. **Expansion of Europe (to 1588).** Three credit hours. Autumn Quarter. Advanced students from other departments admitted only with the consent of the instructor. Mr. Washburne.

A study of the early geographical ideas of the Europeans, their first contact with the outside world, the period of discovery, the creation of the Portuguese empire in the east and the Spanish monopoly in the west, to the collapse of the Iberian control of European expansion by the destruction of the Armada in 1588. Lectures, readings, and discussions.

622. **Expansion of Europe (1588 to 1815).** Three credit hours. Winter Quarter. Advanced students from other departments admitted only with the consent of the instructor. Mr. Washburne.

A study of the rise of the chartered trade companies, the ascendency of the Dutch, the contest between the Dutch and the English for commercial supremacy and the long struggle between the English and the French for maritime supremacy, with its resultant effects upon India and North America through the settlement at the end of the Napoleonic era. Lectures, readings, and discussions.

†623. **Expansion of Europe (1815 to the Present).** Three credit hours. Spring Quarter. Advanced students from other departments admitted only with the consent of the instructor. Mr. Washburne.

A study of the problems of expansion in the nineteenth and twentieth centuries; the development of India; the movement into the Southern Pacific; the partition of Africa and the various phases of modern imperialism after 1876, through the readjustment of territory under the mandate system after the World War. Lectures, readings, and discussions.

† Not given during the academic year 1946-1947.

624. The French Revolution and Napoleon. Three credit hours. Autumn Quarter. General prerequisites must include a major in history. Advanced students from other departments admitted only with the consent of the instructor. Mr. Morley.

Discussion of ideas and conditions in France preceding the Revolution; course of the Revolution, 1789-1795, with emphasis on the Reign of Terror; results of the Revolution as the basis of modern France; more rapid sketch of events, 1795-1815; the Directory; the Revolutionary wars and rise of Napoleon Bonaparte; the Napoleonic Empire. Textbook, lectures, discussion, readings (including memoirs of the time).

625. Modern France (since 1815). Three credit hours. Winter Quarter. General prerequisites must include a major in history. Advanced students from other departments admitted only with the consent of the instructor. Mr. Morley.

Emphasis on internal history of the Third Republic, after introductory sketch of movements from 1815 to 1870. Formulation of republic program in the late Second Empire, founding of the Republic; political developments, 1876-1914; France after the war; the "fall of France." Lectures, discussion, readings.

626. The Near Eastern Question (1815 to the Present). Three credit hours. Spring Quarter. Mr. Fisher.

A study of the conflicting national and international problems which resulted in the disintegration of the Ottoman Empire, the formation of the Balkan States and the development of the present Turkish national government with its role in European affairs. Lectures, readings, discussion.

629. Modern Germany (1789-1918). Three credit hours. Winter Quarter. General prerequisites must include elementary history courses. Advanced students from other departments without these prerequisites must obtain the consent of the instructor. Mr. Grimm.

Introductory lectures on the basic problems and tendencies of German history; Germany and the French Revolution; German Enlightenment and Romanticism and their relation to political thought; the Stein-Hardenberg reforms and the war of liberation; Prussia, Austria and the problem of German unity; the nationalist and democratic movements; the Bismarckian Empire; industrial development; William II and the World War; the German Revolution of 1918. Lectures, readings, reports, and discussions.

630. The Diplomacy of Europe (1878-1919). Three credit hours. Autumn Quarter. General prerequisites must include a major in history. Advanced students from other departments admitted only with the consent of the instructor. Mr. Washburne.

A study with the use of the new material now available, of the diplomatic obligations of the European states from the Congress of Berlin of 1878 to the Paris Conference of 1919; the formation of alliances, the crises which culminated in the war, and the attitude of European leaders. Lectures, readings, and discussions.

631. Constitutional History of the United States (to 1876). Three credit hours. Autumn Quarter. Mr. Dulles.

Constitutional problems involved in the struggle for independence, establishment of the national government, the growth of democracy, the slavery controversy, and the Civil War. Lectures, readings and discussions.

632. Constitutional History of the United States (since 1876). Three credit hours. Winter Quarter. Mr. Dulles.

Constitutional problems arising from the growth of capitalism, the organization of labor, territorial expansion, the first World War and New Deal reforms. Lectures, readings and discussions.

633. The Slavery Controversy in the United States. Three credit hours. Autumn Quarter. Mr. Simms.

The origins of the institution of slavery; the social system of the old South; the psychological, economic, political, and constitutional implications of the controversy; secession, the appeal to arms and the impact of war upon life north and south. Lectures, readings, and discussions.

634. Reconstruction and the New South (1863 to the Present). Three credit hours. Winter Quarter. Mr. Simms.

The controversy over reconstruction plans; the triumph of the industrial order; the social and economic readjustments in the Southern States during and after the period of reconstruction. Lectures, readings, and discussions.

635. American Foreign Policy to the Close of the Civil War. Three credit hours. Autumn Quarter. Mr. Hill.

The foreign relations of the United States, beginning with the diplomacy which resulted in the establishment of independence and including such subjects as the struggle for neutral rights and commercial recognition, the extension of territory on the continent, the origin of the Monroe Doctrine, and the international controversies of the Civil War. Lectures, discussions, and reports.

636. American Foreign Policy since the Civil War. Three credit hours. Winter Quarter. Mr. Hill.

Problems in the diplomacy of the United States resulting from the Civil War, the development of the Monroe Doctrine, the acquisition of dependencies, relations with Latin America and the Orient, arbitration, the Ishmian Canal, and the two World Wars. Lectures, discussions, and reports.

637. Recent History of the United States (1898-1920). Three credit hours. Autumn Quarter. Mr. Dulles.

The impact of modern industrialism upon American imperialism, society, government and foreign policy. Laissez-faire and government regulation, the Progressive movement, the first World War.

638. Recent History of the United States (since 1920). Three credit hours. Winter Quarter. Mr. Dulles.

A continuation of History 637, but may be taken separately. Prosperity and depression, the New Deal, the United States in international affairs, the second World War.

639. The Influence of Immigrant Groups upon United States History. Five credit hours. Spring Quarter. Mr. Weisenburger.

The share of different immigrant groups in the building of the nation, from the colonial period to the present; with special emphasis on the influence of immigration upon American political, economic, social, and cultural development. Lectures, readings, and discussions.

641. The Westward Movement since 1783. Five credit hours. Spring Quarter. Mr. Roseboom.

This course is a continuation of History 644 but may be taken separately. It deals broadly with the westward spread of settlement since 1783, emphasizing such topics as land policies, transportation and trade, Indian relations, sectionalism, frontier social and intellectual life, and the effects of the westward movement on American development.

643. Political Parties in the United States. Five credit hours. Spring Quarter. Mr. Roseboom.

The radical party of the Revolution; the origin and growth of national parties; the slavery issue in party politics; the effect of the Civil War upon parties; party development in recent American history, special attention being devoted to the influence of the new economic and social conditions in creating new parties and policies. Lectures, readings, discussions, and reports.

644. American Colonization and the Westward Movement to 1783. Five credit hours. Autumn Quarter. Mr. Roseboom.

This course deals with the transplanting of European culture and institutions to North America, the resultant international rivalries, the westward spread of English settlement, and the causes and course of the American Revolution in its political, social, economic, and military aspects. For a continuation of this course see History 641.

645. Latin America. Three credit hours. Autumn Quarter. Mr. Hill.

The European background; native cultures of the New World; conquest and settlement; political, social, and economic institutions; the wars for independence. This course affords a natural introduction to History 646. Lectures, readings, and discussions.

646. Latin America. Five credit hours. Winter Quarter. Mr. Hill.

The evolution of the A B C powers, with minor consideration of the other republics of South America; major problems of an inter-American and an international nature. This course is a logical continuation of History 645. Lectures, readings, and discussions. For a continuation of this course, see History 679.

647. History of Canada. Five credit hours. Spring Quarter. Mr. Weisenburger.

An intensive study of Canadian history with special emphasis on the relations of Canada with the United States and with the mother country, and the comparison of Canadian institutions and problems with our own. Lectures, textbook, collateral readings, and discussions.

649. Greek Civilization. Three credit hours. Winter Quarter. Mr. McDonald.

A study of the contributions of Greece to Western civilization; political institutions, law, religion, drama, literature, science, and philosophy. Lectures, readings, and discussions.

650. Roman Civilization. Three credit hours. Autumn Quarter. Mr. McDonald.

A study of Roman contributions to Western civilization; political institutions, Roman law, religions in the Roman Empire with special reference to Christianity, slavery, agriculture, economic life, etc. Lectures, readings, and discussions.

***653. The Ancient History of the Near East.** Three credit hours. Spring Quarter. Mr. McDonald.

A survey of the history of Egypt, Sumer, Akkad, Babylon, and Assyria. Lectures, readings, and reports.

655. Greek History. Five credit hours. Autumn Quarter. Mr. McDonald.

An intensive study of Greece, with a brief introductory survey of the ancient civilization of the Near East. Lectures, readings, reports, and discussions.

656. Roman History. Five credit hours. Winter Quarter. Mr. McDonald.

This course is the natural continuation of History 655. Lectures, readings, reports, and discussions.

676. History of Modern Russia. Three credit hours. Winter Quarter. Mr. Morley.

This course is designed to acquaint the student with the major developments in modern and contemporary Russia. The early period down to the nineteenth century will be treated in broad outline. Emphasis will be given to the changes in Russia during the last century which laid the basis for the revolutions and the rise of Soviet civilization. Lectures, readings, and discussions.

679. Latin America. Five credit hours. Five class meetings each week. Mr. Hill.

A study of the republics of Middle America, with major emphasis on Mexico. This course is a logical continuation of History 645 and 646. Lectures, readings and discussions.

682. History of England, Medieval Period (to 1485). Three credit hours. Autumn Quarter. General prerequisites must include a course in the history of the Middle Ages or consent of the instructor. Mr. Woodring.

History 682, 683, 684 constitute an interdependent sequence in which the history of England and Greater Britain, socially considered, is rapidly surveyed from the earliest times to our own day. The aim of the course is to give a connected narrative, in terms of social, economic, and political conditioning, expressed in terms of historic personalities. Particularly, the necessary background for the student of English literature and of law, will be furnished. The student will be introduced to a wide range of books, both historical and literary. Graduate students will be required to synthesize their readings into a written report.

Not open to students who have credit for History 421.

683. History of England, Tudor and Stuart Periods (1485-1714). Three credit hours. Winter Quarter. General prerequisites must include History 682 or consent of the instructor. Mr. Woodring.

Not open to students who have credit for History 421 and 422.

684. History of England, Hanoverian and Modern Period (1714-1900). Three credit hours. Spring Quarter. General prerequisites must include History 683 or consent of the instructor. Mr. Woodring.

Not open to students who have credit for History 422.

* Not given in 1946-1947.

685. Cultural and Social Eighteenth Century England. Three credit hours. Spring Quarter. Given in alternate years. Mr. Woodring.

The society of the eighteenth century and the politics of George III, the background of the American Revolution and the struggle with revolutionary France in terms of the Industrial Revolution. Lectures, collateral readings, special investigations, and reports.

Not open to students who have credit for History 422.

*686. Contemporary England. Three credit hours. Spring Quarter. Given in alternate years. Mr. Woodring.

Victorian England in its economic, political, and cultural phases transformed by imperialism, the Great War, and the rise of new class theory and organization. Lectures, readings, reports, informal discussions.

689. The History of Ohio. Three credit hours. Autumn Quarter. Mr. Weisenburger.

A general survey of the history of Ohio—social, economic, religious, and political—from the Indian period to the present time.

Not open to students who have credit for History 437.

690. Contemporary Europe (1919-1933). Three credit hours. Winter Quarter. Mr. Washburne.

A study of present day problems. A consideration of the phases of the attempted reconstruction of Europe following the Paris Peace Conference of 1919. This includes the issues involved in the subjects of post war diplomacy, reparations, disarmament, the new governments of Europe and the continental development until the establishment of the dictatorship in Germany.

Not open to students who have credit for History 628.

†691. Contemporary Europe (since 1933). Three credit hours. Spring Quarter. Mr. Washburne.

A continuation of History 690 but may be taken separately. Consideration will be given to the re-armed Germany and its effect upon the affairs of the world, the failure of collective security in Manchuria, Ethiopia, and Spain, the formation of the new alignments and the breakdown of the treaty of Versailles with he settlement at Munich in 1938 and its consequences.

700. Minor Problems in History. One to five credit hours. All Quarters. Open by permission of the instructors.

The course consists of individual study in some field of historical development and is designed to allow the student to work upon a problem in which he is particularly interested.

Special attention in graduate work during the academic year 1945-1946 will be given to:

(a) Latin-American Relations
(b) Recent American History
(c) Contemporary European Problems

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Education, Course 678.

NOTE: For courses in far eastern history see Political Science 648 and 649.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

These prerequisites include acceptable foundation courses of collegiate grade in European and American history, economics and political science.

812. Introduction to Historical Research. Three credit hours. Autumn Quarter. Required of candidates for the Master's degree. Mr. Weisenburger.

A practice course dealing with the problems involved in the preparation of the Master's thesis. Should be taken during the student's first Quarter in the Graduate School.

813. Great European Historians. Three credit hours. Winter Quarter. Required of candidates for the Doctor's degree. Mr. Grimm.

A study of the leading historical writers and schools of Europe, with selected readings from representative writers.

* Not given in 1946-1947.
† Not given during the academic year. 1946-1947.

814. Great American Historians. Three credit hours. Spring Quarter. Required of candidates for the Doctors' degree. Mr. Simms.

A study of the leading American writers and schools of history.

815. Seminar in European History. Three credit hours. Autumn Quarter. History 812 must be included in the general prerequisites or taken concurrently. Mr. Washburne.

A practical course in research. Problem: Paris Peace Conference, 1919.

816. Seminar in European History. Three credit hours. Winter Quarter. History 812 must be included in the general prerequisites or taken concurrently. Mr. Grimm.

A practice course in research.

817. Seminar in European History. Three credit hours. Spring Quarter. History 812 must be included in the general prerequisites or taken concurrently. Mr. Grimm.

A practice course in research.

819. Seminar in American History. Three credit hours. Autumn Quarter. History 812 must be included in the general prerequisites or taken concurrently. Mr. Hill.

A practice course in research. Problem: United States and Latin American Relations.

820. Seminar in American History. Three credit hours. Winter Quarter. History 812 must be included in the general prerequisites or taken concurrently. Mr. Dulles.

A practice course in research.

821. Seminar in American History. Three credit hours. Spring Quarter. History 812 must be included in the general prerequisites or taken concurrently. Mr. Roseboom.

A practice course in research.
Problem: Ohio in the Period after the Civil War.

950. Research in History. Autumn, Winter, and Spring Quarters. Open by permission of the chairman of the department.

This course is to be used only for Master's thesis and Ph.D. dissertation work.

HISTORY OF EDUCATION

(See Education)

HOME ECONOMICS

Office, 220 Campbell Hall

PROFESSORS BRANEGAN, DONELSON, GORRELL, HEYE, AND SCOTT, ASSOCIATE PROFESSORS BANCROFT, DAVIS, HUGHES, LEHMAN, PRESSEY AND PRICE, ASSISTANT PROFESSORS ADAMS, HEINER, IRVINE, KENNEDY, KYLE, LEWIS, MAUCK, MOORE, NEWARK, PETZEL, RYAN AND TURNBULL, MRS. BENHAM, MRS. BROWN, MISS DIRKS, MISS GREEN, MISS KNOWLTON, MISS KOHLER, MISS LANE, MRS. LINVILLE, MRS. MARTIN, MRS. SMITH, MISS WALTZ, MRS. WERTENBERGER, AND MISS YOUNG

In cooperation with the University Hospital, an opportunity is given for dietitian internes to schedule a sequence leading to the Master's degree. Candidates for appointment as student internes should be graduates of the four-year course of a recognized Home Economics department with a major in foods and nutrition or institution management.

Prerequisites for Graduate Work: For admission to graduate work in home economics a student must have a Bachelor's degree with a major in home economics, based on a curriculum equivalent to that of the School of Home Economics. Suitably qualified students wishing to work for a Master's degree in home economics may specialize in the following areas: foods and nutrition, textiles and clothing, household equipment, child development, institution management, home economics education. Each graduate sequence must be approved by an adviser in the chosen area of specialization.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

601. Clothing. Five credit hours. One Quarter. Autumn, Winter, Spring. Eight hours each week for class discussion and laboratory. General prerequisites must include an elementary course in clothing. Miss Ryan.

Application of the principles of designing through draping and tailoring. Opportunity is provided for handling a variety of fabrics in construction problems.

†604. Clothing. Three credit hours. General prerequisites must include an elementary course in clothing, experience in teaching clothing or consent of instructor. Miss Mauck.

Group and individual studies of problems growing out of the current needs expressed by teachers. Problems may be related to methods of teaching, classroom management or garment construction.

610. Nutrition. Three credit hours. Autumn Quarter. Two one-hour periods for lecture and discussion and one two-hour laboratory period each week. General prerequisites must include courses in food, nutrition, agricultural chemistry, and physiology. Miss Donelson.

A consideration of recent human nutrition studies as they relate to modern concepts of nutrition. Some participation in feeding problems of the community.

612. Nutrition: Diet Therapy. Five credit hours. Spring Quarter. Three two-hour periods each week for class discussion and laboratory; other hours to be arranged. General prerequisites must include courses in basic nutrition, agricultural chemistry and physiology. Miss Donelson.

Experience in the use of current literature as a means of following the development of modern concepts of nutrition. Problems of feeding in connection with overweight, underweight, and other abnormal conditions in which diet is an important part of the treatment.

615. Experimental Work in Food Preparation. Five credit hours. Autumn Quarter. General prerequisites must include courses in foods and agricultural chemistry. Miss Green.

Application of experimental methods to problems involved in the preparation of foods.

616. Nutrition of Infants and Children. Three credit hours. Winter Quarter. General prerequisites must include a course in agricultural chemistry and a course in basic nutrition. Mrs. Martha Lewis.

A study of the problems involved in the feeding of children. A review of the literature with laboratory work in planning diets. Observations will be made in the Home Economics Nursery School.

619. Household Equipment. Three credit hours. Autumn Quarter. Two hours for class discussion and one two-hour laboratory period each week. General prerequisites must include a course in household equipment. Miss Davis.

Application to home situations of the recent developments in lighting, with special emphasis on selection, care, and use of home lighting equipment.

622. Household Equipment: Performance Testing. Five credit hours. Winter Quarter. Two hours for lecture and three two-hour laboratory periods each week. General prerequisites must include a course in household equipment, fifteen Quarter credit hours in natural science, and twenty additional Quarter credit hours in home economics. Miss Davis.

Experimental problems on the performance of the major types of household equipment used in preparation of food, laundering and cleaning.

627. Laboratory in Home Management. Five credit hours. One Quarter. Autumn, Winter, Spring. Two hours of group conference and scheduled laboratory each week and other laboratory hours to be arranged. General

† Not given during the academic year 1946-1947.

prerequisites must include courses in food preparation, nutrition, home management, household equipment or home furnishings. Miss Adams.

An application of the principles presented in other courses. Each student is provided with an opportunity to study the management of one or more homes, the needs of the student being considered.

628. Selection of Furnishings for the Home. Three credit hours. Winter Quarter. Two periods each week for class discussion and one two-hour laboratory. General prerequisites must include elementary courses in economics and a course in home furnishing. Miss Heiner.

A study of the consumers' problems in the selection of home furnishings. Field work is arranged with retail merchants.

630. The Purchase of Foods for Institutions. Three credit hours. One Quarter. Autumn, Winter, Spring. One lecture and two two-hour laboratory periods each week. General prerequisites must include courses in foods and elementary courses in economics. Mrs. Benham.

A study of purchasing food on a large quantity basis. Marketing practices studied from the standpoint of buying for institutions.

631. Institution Cookery and Equipment. Five credit hours. One Quarter. Autumn, Winter, Spring. Hours for discussion and laboratory to be arranged. General prerequisites must include courses in foods. It is recommended that Home Economics 630 and 632 be taken concurrently. Mrs. Kennedy, Miss Kyle.

Application of principles of cookery to large quantity preparation. A study of standardized formulas, calculation of food costs, the construction, operation and use of equipment, the writing of specifications, and the drawing of floor plans.

632. Institution Organization and Administration. Five credit hours. Autumn and Winter. Hours to be arranged. It is recommended that Home Economics 630 and 631 be taken concurrently. Otherwise, Home Economics 630 and 631 or the equivalent are prerequisite. Miss Kyle.

A study of the principles of organization and management applied to the problems of housing and feeding institution groups. Supervised experience in club service and cafeteria management.

634. Sanitation for Food-Serving Establishments. Three credit hours. Autumn Quarter. General prerequisites must include a course in microbiology in relation to man or a course in general bacteriology. Mrs. Lewis.

Application of the principles involved in sanitary food handling. Consideration of practical problems which are concerned with protection of health and with prevention of food spoilage and contamination, and which involve practices in personal hygiene; handling, storage and serving of food; pest control; and the washing, handling and storage of dishes and utensils.

635. Foods. Three credit hours. Winter Quarter. General prerequisites must include courses in food preparation and family nutrition. Miss Green.

This course considers the recent important contributions of research relative to the preparation and preservation of foods.

†644. The Teaching of Home Economics. Three credit hours. Mrs. Pressey.

The influence of the newer movements in secondary education on home economics. The place of home economics in the experimental secondary school programs and in such developments as integrated and unified educational offerings, core courses, and special home economics courses from a functional point of view.

661. Child Development. Three credit hours. One Quarter. Autumn, Winter, Spring. Two hours for class discussion and four morning hours to be arranged. General prerequisites must include an introductory course in child development, and fifteen Quarter-credit hours of social science. Students not majoring in home economics may, with the consent of the instructor, substitute other courses related to the study of young children and family relations. Miss Heye.

Application to the principles of child development to actual work with pre-school children. Appropriate guidance techniques will be discussed and used.

† Not given during the academic year 1946-1947.

†662. **Child Development.** Three credit hours. General prerequisites must include an introductory course in child development.

This course considers methods of evaluating the growth of children, techniques for measuring growth over a period of time, and ways in which growth can be directed.

†670. **Clothing: Fashion.** Three credit hours. Winter Quarter. Three meetings for class discussion each week. General prerequisites must include ten hours in fine arts and home economics (textiles and clothing), and ten hours in economics, sociology or history. Miss Mauck.

A study of the origin and development of the fashion movement and its relation to the manufacturing of and consumption of textiles and clothing. An analysis of sources of current fashion information, of methods and practices used in style coordination; a consideration of fashion trends, acceptances, and cycles, and their effect on the markets and the consumer.

671. **Textiles.** Three credit hours. Spring Quarter. One hour for discussion and two two-hour laboratory periods each week. General prerequisites must include ten hours in home economics including textiles and ten hours of natural science. Miss Petzel.

In this course, the student will gain experience in planning and conducting textile tests and in evaluating the resulting data. Fibers, yarns, fabrics, and finishing agents will be studied in relation to probable durability and serviceability. Some consideration will be given to the development, present status, and importance of textile testing.

Not open to students who have credit for Home Economics 602, five hours, but open to those who have had the course for three credit hours only.

672. **Textiles: Historic.** Three credit hours. Spring Quarter. Three meetings for class discussion each week. General prerequisites must include a course in textiles, a course in fine arts, and ten hours in social science. Miss Petzel.

Historic textiles will be studied in relation to their use in clothing and household furnishings. Particular emphasis will be placed on fabrics of periods and countries which have most strongly influenced textiles in recent times. These sources of influence include ancient Egypt, Greece and Rome; and Gothic and Renaissance Italy, Spain, France, and England. Modern fabrics of Europe and America will also be studied. Consideration will be given to the social, economic, technical, aesthetic, and historical background of textiles. This course will include illustrated lectures, discussions and visits to exhibitions and stores. It aims to develop appreciation of textiles and discrimination in their selection.

†673. **Textiles: Recent Developments.** Three credit hours. General prerequisites must include at least one home economics course concerned with the study of textiles. Miss Petzel.

A study of recent developments and research in the field of textiles. Discussion and reports based on individual assignments.

681. **Home Economics Extension Methods.** Five credit hours. Winter Quarter. Four meetings for discussion and one two-hour laboratory each week, with opportunity for field observation. Prerequisite, a general course in extension methods and consent of the instructor. Miss Minnie Price assisted by other members of the Home Economics Extension Staff.

This course is planned to give a knowledge of: Home economics extension methods, relationship of home economics extension to other educational movements, resources of the state, county and community.

701. **Special Problems in Home Economics.** Three to fifteen credit hours for one Quarter or more. To be given in units of three or five hours. Autumn, Winter, Spring. One conference or more each week.

Problems in various phases of home economics chosen for individual study. Groups will be organized as follows:

(a) Problems in food preparation. Autumn and Spring Quarters. Miss Green, Miss Hughes.
(b) Problems in nutrition and dietetics. Autumn, Winter, Spring. Miss Donelson, Miss Hughes, Mrs. Lewis.
(c) Problems in textiles. Autumn, Winter, Spring. Miss Petzel, Miss Turnbull.
(d) Problems in clothing. Autumn, Winter, Spring. Miss Mauck, Miss Ryan.
(e) Problems in home furnishing. Winter Quarter. Miss Heiner.
(f) Problems in household equipment. Spring Quarter. Miss Davis.

† Not given during the academic year, 1946-1947.

(g) Problems in home management. Autumn, Winter, Spring. Miss Newark.
(h) Problems in institution management, equipment, and food buying. Autumn and Spring Quarters. Mrs. Kennedy, Miss Kyle.
(i) Problems in teaching home economics. Autumn, Winter, Spring. Mrs. Pressey, Miss Scott.
(j) Problems in child development. Autumn and Spring Quarters. Miss Heye.

†702. **Supervision of Home Economics Teaching.** Three credit hours. General prerequisites must include Home Economics 644 or consent of the instructor.

A course for experienced teachers of home economics who are interested in supervising student teachers or in working with home economics teachers service.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

802. **Seminar in Home Economics Teaching.** Three to five credit hours. Winter Quarter. Home Economics 644 must be included in the general prerequisites or taken concurrently. Consent of the instructor must be obtained. Mrs. Pressey, Miss Scott.

A study of content, methods, and administration of home economics teaching.

803. **Seminar in Foods and Nutrition.** Three credit hours. Autumn Quarter. General prerequisites must include the consent of instructor. Miss Donelson, Mrs. Lewis and others.

Conferences and reports on topics in foods and nutrition.

950. **Research in Home Economics.** Autumn, Winter, Spring. Miss Davis, Miss Donelson, Miss Heye, Miss Hughes, Mrs. Kennedy, Miss Lehman, Miss Newark, Miss Petzel, Mrs. Pressey, Miss Scott.

Investigational work bearing upon the problems of living, either in the home, the institution or under commercial conditions.

HORTICULTURE AND FORESTRY

Office, 118 Horticulture and Forestry Building

PROFESSORS GOURLEY, PADDOCK (EMERITUS), BROWN, HOWLETT, AND LAURIE, ASSOCIATE PROFESSORS CHADWICK AND VAN DOREN, ASSISTANT PROFESSORS DILLER AND KIPLINGER

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

These prerequisites include acceptable courses in pomology, vegetable gardening, floriculture and forestry.

601. **Horticultural Plant Breeding.** Three credit hour. Winter Quarter. Three recitations each week. Given in alternate years. Mr. Laurie, Mr. Brown.

A study of the methods of breeding of horticultural crops; the modification and improvement of plants under cultivation, together with a discussion of the theories of heredity.

602. **Experimental Horticulture.** Three credit hours. Autumn Quarter. Two recitations and five hours laboratory each week. Botany 605 must be included in the general prerequisites or taken concurrently. The course is designed for those specializing in pomology, vegetable gardening, floriculture, and ornamental horticulture although it is open to students of other departments. Mr. Howlett.

This course involves primarily the effect of environmental factors upon the growth, flowering, and fruiting of horticultural plants. Emphasis is placed upon the examination of the plants themselves. Particular attention is given to the relation between the environment and practical problems in the greenhouse, field, or orchard. Among the subjects considered are: soilless culture; nitrogen, phosphorus, potassium, calcium and magnesium deficiencies; water deficiency;

† Not given during the academic year 1946-1947.

carbohydrate deficiency and the nitrogen-carbohydrate relationship. Some attention is given to the micro-nutrients as well as to the effect of growth regulating substances upon flowering and fruiting.

603. Experimental Horticulture. Three credit hours. Winter Quarter. Two lectures and four hours laboratory period each week of which two hours have the time scheduled. Botany 605 must be included in the general prerequisites or taken concurrently. Mr. Van Doren.

The course involves a study of photosynthesis, respiration, transpiration, translocation, and other physiological processes as related to the practical problems in pruning, propagation, spraying, fertilization, cultivation, harvesting, and storage of horticultural crops. Methods and equipment used in studying the processes, a critical analysis of outstanding horticultural contributions, and preparation of subject matter for publication, will be considered. The course is designed especially for students majoring in floriculture, pomology, and vegetable crops, but is open to students in other departments.

605. The Literature of Horticulture. Three credit hours. Winter Quarter. Two lectures and one conference each week. Given in alternate years. Mr. Gourley.

A study of the literature of horticulture.

608. The Handling, Packing, and Storage of Fruit. Three credit hours. Autumn Quarter. One recitation and two two-hour laboratory periods each week. Given in alternate years. Not open for graduate credit for students majoring in horticulture. Mr. Van Doren.

Operations and equipment used in harvesting, handling, and storing fruits are studied. Emphasis is placed on time of picking, packing receptacles, packages, and the packing operation of tree and small fruits. The different types of storages and their construction and operation is also made a main feature of the course. Particular emphasis is given to the physiological principles underlying the common practices in the handling and storage of fruits.

***621. Systematic Study of Vegetables.** Three credit hours. Autumn Quarter. One recitation and two two-hour laboratory periods each week. Given in alternate years. Mr. Brown.

A systematic study of the botany and origin of the principal vegetable forms and varieties including their description, identification, and special table and storage qualities; adaptation of soils, and resistance to disease.

622. Advanced Vegetable Gardening. Five credit hours. Spring Quarter. Four recitations and one two-hour laboratory period each week. Mr. Brown.

A continuation of Horticulture 522.

Devoted to the study of the history, anatomy, physiology, and culture of the principal vegetable crops including propagation, choice of varieties, soil adaptation, soil preparation, planting, fertilizing, cultivation, pest control, harvesting, storage methods, marketing and cost of production, and income.

628. The Marketing of Fruits and Vegetables. Five credit hours. Spring Quarter. Five lecture periods each week. Alternate with Horticulture 651. Mr. Hauck.

The principles involved in marketing fruits and vegetables will be considered. Attention will be given to various phases of preparation for market, distribution, transportation, terminal facilities, auctions, inspection, market news, etc. Emphasis will be placed upon the market outlets and methods which are most suited to Ohio producers. One or two inspection trips of two or three days each will be made.

649. Advanced Plant Propagation. Five credit hours. Winter Quarter. Four recitations and one three-hour laboratory period each week. General prerequisite must include courses in plant propagation and ornamental plants and Botany 605. Mr. Chadwick.

This course is devoted to an intensive and detailed physiological, anatomical, and practical study of the principles and practices of propagation.

650. Principles and Practices of Nursery Management. Five credit hours. Spring Quarter. Four recitations and one four-hour laboratory period

* Not given in 1946-1947.

each week. General prerequisites must include Horticulture 649. Given in alternate years. Mr. Chadwick.

This course is designed to acquaint the student with the fundamentals and practices involved in the management of a modern nursery. The status of the industry, its development in general, and the growing, merchandising and marketing of nursery products in all its phases are considered. Trips to some of the nurseries in the state will be required.

*651. Marketing of Greenhouse and Nursery Products. Three credit hours. Spring Quarter. Three recitations each week. General prerequisites must include Business Organization 700. Alternate with Horticulture 628. Mr. Laurie, Mr. Chadwick.

The application of marketing techniques to the sale of cut flowers, pot plants and nursery stock will be considered. Attention will be given to the preparation of crops for market, to grading, packaging, shipping and selling direct and through commission houses. Emphasis will be placed on the study of markets and the elimination of periodic gluts. Several inspection trips will be made.

652. Structure of Vegetables and Ornamental Plants. Three credit hours. Autumn Quarter. One recitation and two two-hour laboratory periods each week. Mr. Gourley.

A study of the structure of vegetables and ornamental plants as they relate to the economic production of these crops. The course is designed for advanced students who desire to make a critical study of horticultural plant material.

653. Structure of Economic Fruits. Three credit hours. Winter Quarter. One recitation and two two-hour laboratory periods each week. Mr. Gourley.

A study of the structure and vascular arrangement of horticultural fruits. The viewpoint and emphasis of this course are designed to familiarize students with the structures that play a part in the development of various types of fruits and the relation of these structures in cultural development, spraying, storage, and culinary use.

683. Arboriculture. Five credit hours. Autumn Quarter. Four recitations and one four-hour laboratory period each week. Mr. Chadwick.

A study of the care of ornamental trees and shrubs. Fertilization, spraying, pruning, and tree surgery. A suitable course for those interested in city forestry, park maintenance, and cemetery development.

701. Minor Investigations. Three to fifteen credit hours, taken in units of three or five hours each Quarter for one or more Quarters. Autumn, Winter, Spring. Offered at Columbus and at Wooster. All instructors.

This course is for students who desire to work out special problems in the fields of pomology, vegetable gardening, floriculture or forestry. Students will elect work in their desired subjects after a conference with the instructor in charge.

704. Horticultural Seminar. One credit hour. Autumn and Winter Quarters. Required of all graduate students majoring in horticulture. Offered at Columbus and at Wooster. All instructors.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

950. Research in Horticulture and Forestry. Autumn, Winter, and Spring Quarters. Graduate students may do investigational work in some phase of the following subjects: pomology, vegetable gardening, plant breeding, floriculture, and forestry. Offered at Columbus and at Wooster. Mr. Gourley, Mr. Brown, Mr. Laurie, Mr. Chadwick, Mr. Van Doren, Mr. Howlett, Mr. Diller.

INDUSTRIAL ARTS EDUCATION
(See Education)

* Not given in 1946-1947.

INDUSTRIAL ENGINEERING
Office, 125 Industrial Engineering Building

PROFESSORS LEHOCZKY AND EDMONDSON, ASSOCIATE PROFESSOR STANTON, ASSISTANT PROFESSOR DAVIS

Prerequisites for Graduate Work. Graduate students other than those pursuing graduate work under the five-year combination curriculum must fulfill one of the following requirements:

(a) They must be graduates of a curriculum in Industrial Engineering (Engineering Administration, Management Engineering, etc.) fully accredited by the Engineers' Council for Professional Development. Students who can meet this prerequisite will normally be able to complete the work for the M.Sc. degree in three Quarters of residence.

(b) Or, they must be graduates of a curriculum in Mechanical Engineering: (Industrial or Management Options) which is fully accredited by the Engineers' Council for Professional Development. Students who fall into this category can normally compete their course requirements for the M.Sc. degree in four Quarters of residence.

(c) Or, they must be graduates of an engineering curriculum other than defined in (a) and (b), accredited by the Engineers' Council for Professional Development. Students in this category will require from five to six Quarters of residence to complete the requirements for the M.Sc. degree.

(d) There may be special cases which do not fall into categories (a), (b), or (c), but as a general rule none will be admitted unless they have the equivalent of the basic requirements of the Ohio State University curriculum in Industrial Engineering in the fields of Mathematics, Physics, Chemistry, Engineering Drawing, and Mechanics. The time requirement to complete the work for the M.Sc. degree in these cases will vary with individuals depending upon their background and the nature and quality of courses they have completed. This in addition to whatever basic requirements may be set up by the Graduate School for admission to the School.

Areas of Study. The Department offers five major areas of study within the field of Industrial Engineering. These are: Methods Engineering, Personnel (Engineering Viewpoint), Production Engineering, Engineering Costs, and Safety Engineering.

Prerequisite for Graduate Work in Welding Engineering. Candidates for the M.Sc. degree majoring in Welding Engineering are expected to have completed substantially the same work for their undergraduate degrees as is offered for the degree B.I.E. (Welding Engineering) at the Ohio State University. Since the probability that this requirement can be fulfilled by graduates of curricula other than the standard is very remote, candidates for the Master of Science degree will be required to complete from four to six Quarters of residence depending entirely upon their background.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

The following courses do not carry graduate credit for students who received the degree Bachelor of Industrial Engineering from The Ohio State University: 601, 602, 603, 604, 661, 701, 702, 706, 751, 752, 761, 762, and 771.

601. Management of Men in Engineering Industries. Four credit hours. One Quarter. Autumn, Winter, Spring. Four recitations each week. General prerequisites must include an acceptable course in elementary machine work or practical experience. Mr. Stanton.

The development of engineering organizations and a study of existing organizations. The management of men in engineering organizations.

Not open to students who have credit for Industrial Engineering 712.

603. Time and Motion Study. Five credit hours. One Quarter. Autumn and Winter. Three recitations each week. General prerequisites must include Industrial Engineering 661.

Principles, aims and application of time and motion study; job analysis, standardization, formula construction, job and wage evaluation.

604. Time and Motion Study Laboratory. Four credit hours. One Quarter. Winter and Spring. Eight hours of laboratory each week. General prerequisites must include Industrial Engineering 603.

Laboratory application of subject matter covered in Industrial Engineering 603. Simple and complex cycles, motion analysis, micromotion studies, loop analysis, simo-charts, assembly, machine shop and foundry applications. Standards reports including formula reports.

Not open to students who have credit for Industrial Engineering 653.

641. Theory of Welding. Three credit hours. Autumn Quarter. Two lectures or recitations and one three-hour labortory period each week. General prerequisites must include a course in forging, shop-heat-treating, and welding and Metallurgy 606. Mr. Stitt.

Fundamental methods and principles of welding; selection of method and type of welding, with due emphasis on economic factors. Welding symbols; metallurgical science pertaining to welding. Laboratory demonstrations.

646. Welding Science and Its Applications. Three credit hours. One Quarter. Autumn, Winter, Spring. Three lectures or recitations each week. General prerequisites must include Mechanics 602. Mr. Stitt.

A basic study of welding and its applications.

661. Production Control Charts. Three credit hours. One Quarter. Autumn, Winter, Spring. Two recitations and one two-hour laboratory period each week. Mr. Lehoczky.

The application of charts and graphs to production problems, organization, management, operation, labor and cost control. Laboratory exercises designed to supplement the theory.

*706. Methods of Waste Elimination. Three credit hours. Spring Quarter. Three lectures and recitations each week. Mr. Lehoczky.

A study of industrial standards, their control and application. Simplification, inspection, waste elimination, and allied subject.

708. Plant Equipment and Design. Five credit hours. Autumn Quarter. General prerequisites must include Industrial Engineering 604 and 751. Mr. Edmondson.

A study, both from the technical and the economic points of view, of equipment used in manufacturing plants. Included are small tools, machine tools, mass production equipment, quality control equipment, materials handling and general and special purpose equipment. A study of the general problem of plant design, including structure, space utilization, layout and floor, and related topics such as power requirements and distribution, heat, light, ventilation, transportation and so forth.

709. Production Engineering. Five credit hours. Winter Quarter. General prerequisites must include Industrial Engineering 604 and 708. Mr. Edmondson.

Production engineering involves the integration and correlation of the several areas of Industrial Engineering activity in terms of a product. Included are production design, equipment planning, tool design, production and its control, quality control, cost reduction, standardization, process development, product development and others.

710. The Laws of Engineering Management. Three credit hours. One Quarter. Autumn and Spring. Three recitations each week. General prerequisites must include Industrial Engineering 601 and 603. Mr. Lehoczky.

A consideration from an engineering standpoint of the fundamental laws of engineering management.

Not open to students who have credit for Industrial Engineering 602.

*714. Time and Motion Study. Three credit hours. Autumn Quarter. Three recitations and six hours of preparation each week.

Principles, aims, methods and applications of time and motion study including job analysis, job standardization, formula construction, job evaluation and wage evaluation.

Not open to students majoring in Industrial Engineering.

Not open to students who have credit for Industrial Engineering 603, 604 or 715.

*715. Principles of Industrial Engineering. Three credit hours. Spring Quarter. Three recitations and six hours of preparation each week. General prerequisites must include two or more shop courses or their equivalent in industrial experience.

A general survey of the industrial engineering phases of a manufacturing establishment with emphasis upon the relationship of the several phases to other engineering activities. Included are the development of engineering organizations, the management of men, materials,

* Not given in 1946-1947.

machines and equipment, time and motion study, job and wage evaluation, standardization, waste elimination, and so forth.

Not open to students majoring in Industrial Engineering.

Not open to students who have credit for Industrial Engineering 601, 603, 712 or 714.

741. Welding Engineering and Applications. Three credit hours. Winter Quarter. Three lectures or recitations each week. General prerequisites must include Industrial Engineering 641 and Mechanics 605. Mechanics 705 must be taken concurrently. Mr. Stitt.

Continuation of Industrial Engineering 641; welding specifications, inspection and applications. Effect on manufacturing processes and construction.

742. Welding Design. Three credit hours. Spring Quarter. Two lectures or recitations and one three-hour laboratory period each week. General prerequisites must include Industrial Engineering 741. Civil Engineering 717 and Mechanical Engineering 727 must be taken concurrently. Mr. Stitt.

Welding design in the mechanical and structural fields; economic comparisons of welding designs and other methods of manufacture. Laboratory practice in computations and welding drawings.

743. Advanced Welding Design. Five credit hours. Autumn Quarter. Three lectures or recitations and two three-hour laboratory periods each week. General prerequisites must include Industrial Engineering 742 and Mechanical Engineering 728 must be taken concurrently. Mr. Stitt.

Continuation of Industrial Engineering 742, with more complicated designs.

748. Special Problems in Welding Engineering. Three to fifteen credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include Industrial Engineering 741. Mr. Stitt.

This course is intended to give the student an opportunity to pursue special studies not offered in the fixed curriculum in the areas related to courses 641, 741, 742 and 743. This work may be taken in more than one area.

751. Tool Engineering. Three credit hours. Spring Quarter. One recitation and six hours of drawing-room practice each week. General prerequisites must include Industrial Engineering 603. Mr. Edmondson.

A course in the design of tools, jigs, and fixtures. Attention given to the forms, life and efficiencies of cutting tools. The simple elements of fixture design, such as different forms, locating points, clamping devices, and standardized parts, with drawing-room practice leading up to design of the more complicated fixtures.

761. Elementary Production Control. Three credit hours. One Quarter. Autumn and Winter. Three lectures and recitations each week. General prerequisites must include a course in calculus, Accounting 624, and Industrial Engineering 641 or 603. Mr. Stanton.

Quantitative analysis from the standpoint of cost control of machines, equipment, and labor

762. Advanced Production Control. Three credit hours. One Quarter. Winter and Spring. Three lectures and recitations each week. General prerequisites must include Industrial Engineering 761. Mr. Stanton.

The application of quantitative methods of control in industry in the fields of inverse relationships, least cost combinations, purchasing quantities, seasonal production and related problems.

771. Safety Engineering. Three credit hours. One Quarter. Spring and Autumn. Three lectures each week. General prerequisites must include a course in elementary machine work and six hours additional credits in other laboratory courses involving mechanical equipment. Mr. Lehoczky.

The nature, causes, and costs of industrial accidents and occupational diseases. Methods of accident prevention, physical, supervisory, and education. Ohio laws, regulations, and aids.

799. Special Problems in Industrial Engineering. Three to fifteen credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include consent of the instructor.

This course is intended to give the advanced student an opportunity to pursue special studies not offered in fixed curricula, in areas related to courses such as Industrial Engineering 603, 604, 708, 709, 762, and 771.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

801-802-803. Seminar in Industrial Engineering. One credit hour. Autumn, Winter and Spring Quarters. Required of all graduate students majoring in Industrial Engineering. Mr. Lehoczky.

811. Methods Engineering. Three to ten credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include Industrial Engineering 603 and 604. Mr. Lehoczky.

Advanced work in one or more special phases of time study, motion study, job evaluation, wage analysis and payment systems, speed and effort rating. Analysis of work set-ups, of production lines and related matters. Design and redesign problems. The viewpoint of unions and problems arising from labor-management relationship.

821. Problems in Production Engineering. Three to ten credit hours. Autumn, Winter and Spring Quarters. General prerequisites must include Industrial Engineering 709. Mr. Edmondson.

Advanced work in one or more phases of production engineering involving problems in production design, equipment planning, tool design, quantity and quality control, cost reduction, development, and so forth.

831. Problems in Sales Engineering. Three to ten credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include Industrial Engineering 601, 603, 708, 709, 761 and 762. Mr. Lehoczky, Mr. Edmondson, and Mr. Stanton.

An analytical study of typical sales engineering problems with emphasis upon the technical aspects of the products in question and their relationship to the manufacturing set-up of the user.

841. Welding Engineering Research. Three to ten credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include Industrial Engineering 741, 742, and 743. Mr. Stitt.

Advanced work in the theory of welding, in welding engineering application and in design problems.

851. Personnel Research in Engineering Industries. Three to ten credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include Industrial Engineering 601 and 710. Mr. Stanton.

Advanced work on a graduate level in one of the several phases of personnel management in engineering industries. An integral part of the program which is established under the leadership of the Personnel Research Board.

861. Production Control Research. Three to ten credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include Industrial Engineering 761, and Industrial Engineering 762. Mr. Stanton.

Advanced work in the several phases of production control (see Industrial Engineering 761 and 762) including the design of a manufacturing enterprise, the organizational set-up of engineering establishments and similar problems.

871. Safety Engineering Research. Three to ten credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include Industrial Engineering 771. Mr. Lehoczky.

Advanced work in one or more phases of safety engineering: plant design, equipment design, accident prevention programs and others. The course is designed to be an integral part of a general program in safety engineering and cannot be taken alone.

950. Research in Industrial Engineering. Autumn, Winter, and Spring Quarters. Mr. Lehoczky.

Research work in several phases of Industrial Engineering on the doctoral level.

Open only to advanced graduate students who are majoring in Industrial Engineering.

INTERNATIONAL STUDIES

Office, 100 University Hall

SUPERVISORY COMMITTEE

PROFESSORS HELMS, HENDRIX, PATTON, SMITH, AND WASHBURNE

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

601-602. Minor Problems in International Studies. Three credit hours. Winter and Spring Quarters. One two-hour class meeting each week. Open to students majoring in International Studies or having equivalent preparation. General prerequisites must include Political Science 613 or its equivalent. Lectures, panel discussions and informal conferences, the intent being to meet the special interests of those enrolled and allow full scope to the initiative of each student. Mr. Helms with the collaboration of other specialists in International Studies Curriculum.

Special topics on international problems will be assigned to each student each Quarter. The topics will be related to the student's area or topical interests. Results will be tested by oral and written reports and special examinations.

721-722-723. Europe. Two credit hours. Autumn, Winter, and Spring Quarters. One two-hour class meeting each week. General prerequisites must include senior standing in International Studies Curriculum. Mr. Peattie with the collaboration of other specialists in International Studies Curriculum.

A proseminar on selected regions in Europe. Students will study the political, economic, social and cultural institutions of a particular region, such as the Balkans, Germany, France, Scandinavia, etc.

731-732-733. Latin America. Two credit hours. Autumn, Winter, and Spring Quarters. One two-hour class meeting each week. General prerequisites must include senior standing in International Studies Curriculum. Mr. Carlson with the collaboration of other specialists in International Studies Curriculum.

A proseminar on selected regions in Latin America. Students will study the political, economic, social and cultural institutions of a particular region, such as Argentina, Central America, Amazon Basin, etc.

741-742-743. The Orient. Two credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include senior standing in International Studies Curriculum. Mr. McCune with the collaboration of other specialists in International Studies Curriculum.

A proseminar in selected regions in the Orient. Students will study the political, economic, social and cultural institutions of a particular region, such as Japan, China, Manchukuo, Malaya, Burma, etc.

ITALIAN

(See Romance Languages and Literature)

JOURNALISM

Office, 203 Journalism Building

PROFESSORS POLLARD, MYERS (EMERITUS), AND LUXON,
ASSOCIATE PROFESSOR GETZLOE, ASSISTANT PROFESSOR HARSHA, MR. O'BRIEN

Courses of study leading to the Master's degree may be undertaken as a continuation of either the editorial or management curriculum in the School of Journalism. A major in journalism for the Master's degree does not necessarily mean that all forty-five hours required for the degree shall be in journalism. Related courses in the social sciences, advertising, or English may be scheduled in an integrated program worked out by the student and his adviser. Thus, for example, a journalism-advertising, journalism-history, journalism-political science, or journalism-sociology integrated course of study may be arranged, according to the area of interest of the individual student.

Requirements for the Master's degree with a major in journalism include an undergraduate background of a satisfactory number of basic courses in journalism, two journalism seminars preceding the thesis (research) course, and an approved thesis. In addition, each student is required to take either History 812, Introduction to Historical Research, or Political Science 631, Methods of Governmental Research, as a practice course in research, or satisfy his adviser that he is competent to handle a research problem.

Students who plan a minor in journalism in connection with a major in another field must have the written approval of the Director of the School of Journalism.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

*601. News Editing. Three credit hours. Spring Quarter. Two recitations and one two-hour laboratory period each week. General prerequisites must include a course in copyreading. Permission of instructor necessary. Mr. Getzloe.

Study of and practice in the evaluation of news, especially that furnished by press associations. Study of contemporary telegraph and cable news in the daily press, with a comparison of the editing and news evaluation of different newspapers, including rewrite.

602. Magazine Writing and Editing. Five credit hours. One Quarter. Autumn and Spring. Four lecture and recitation periods and one laboratory period each week. Prerequisite, permission of the instructor. Mr. Getzloe, Mr. O'Brien.

Instruction in and writing of articles for magazines of general circulation and for trade, class and technical journals. Problems of magazine management, editing and production.

603. Critical Newspaper Writing. Three credit hours. Spring Quarter. General prerequisites must include elementary courses in journalism or permission of the instructor must be obtained. Mr. Getzloe.

Study of the work of the newspaper dramatic, literary, music, and art critic, with practice in the writing of reviews and criticism.

605. Writing Radio News. Three credit hours. One Quarter. Autumn and Winter. General prerequisites must include an introductory radio course, elementary courses in journalism or permission of the instructor. Mr. Getzloe.

The study of the problems of preparing and presenting news material for the radio. Emphasis on the gathering, selection, and editing of news material for radio broadcasting. Practice in the processing of press association reports for newscasts.

606. Advanced Radio News Writing. Three credit hours. Winter Quarter. General prerequisites must include Journalism 605. Mr. Getzloe.

Continuation of Journalism 605, with emphasis on the problems of the news analyst.

614. Law of the Press and Radio. Five credit hours. Spring Quarter. Five recitations each week. General prerequisites must include elementary courses in journalism. Mr. Pollard.

Origin and development of freedom of expression, history, principles, and provisions of the laws of libel and slander, copyright and other statutes affecting newspapers, other publications, and radio.

* Not given in 1946-1947.

617. Public Relations. Three credit hours. Winter Quarter. Three class meetings each week. Permission of instructor necessary.

Study of public relations problems, policies, and practices of welfare and professional organizations, educational and other institutions, industry, commerce and government agencies. A study of the manner in which these organizations make their activities known and how they can most effectively use the media of publicity, the press especially. Organizing of publicity projects and campaigns and their effect on public opinion and action.

621. The Editorial Page. Three credit hours. Autumn Quarter. Three recitations each week. Mr. Getzloe.

Study of the purpose, form, style, and spirit of the editorial. Consideration of current events, practice in news interpretation and other editorial writing, and study of editorial pages.

622. The Press and Contemporary Affairs. Three credit hours. Winter Quarter. Three recitations each week. Mr. Pollard.

The place of the newspaper in the social system. Study of its function and nature as an agency affecting public opinion. Discussion and interpretation of current events. The effects of pressure groups and propaganda upon the press.

623. Comparative Journalism and Radio. Three credit hours. Spring Quarter. General prerequisites must include a course in the history of journalism in the United States and elementary courses in political science. Mr. Getzloe.

Consideration of the press and radio of other nations, particularly that of the democratic as against the dictator countries, and by comparison and contrast with that of the United States. A study of various aspects of government control and censorship in other nations in terms of current developments.

626. The Newspaper Business Office. Three credit hours. Autumn Quarter. Three recitations each week. Mr. Pollard.

Consideration of the tasks and problems of the newspaper business manager, such as location, valuation, cost-finding, and advertising from the publisher's standpoint.

628. Newspaper Circulation and Promotion. Three credit hours. Winter Quarter. Three class meetings each week. General prerequisites must include Journalism 626. Mr. Pollard.

Factors affecting newspaper circulation. Types of newspaper circulation, and their evaluation. Circulation methods and policies in use on various types of newspapers, together with promotional, merchandising, and service functions of the newspaper.

650. Minor Problems in Journalism. One to five credit hours. Autumn, Winter, and Spring Quarters. Informal conferences and individual problems.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

802-803-804. Seminar in Journalism. Three to five credit hours. Autumn, Winter, and Spring Quarters. Mr. Pollard.

Research in various fields in journalism. Integrated reading and research in the fields of (1) history of American (or Ohio) journalism, (2) the press and public opinion, (3) the press and political processes, (4) special problems in the law of the press, (5) newspaper management problems, (6) radio news problems.

950. Research in Journalism. Autumn, Winter, and Spring Quarters. Mr. Pollard.

This course is to be used only for the master's thesis.

LATIN LANGUAGE AND LITERATURE

(See Classical Languages and Literature)

LAW
Office, 113 Page Hall

PROFESSORS VANNEMAN, MATHEWS, HALLEN, LATTIN, HUNTER, ROSE, AND STRONG, ASSOCIATE PROFESSORS STEVENS AND CALLAHAN, ASSISTANT PROFESSOR STANGER

Constitutional Law. Eight credit hours. Four hours, Winter Quarter; four hours, Spring Quarter.

A study of American constitutional law as developed through an examination of the jurisdiction, powers, techniques, and functions of the Supreme Court of the United States. The greater part of the course is devoted to the functions of the Court in umpiring federal-state and state-state relationships and in balancing governmental and private interests. Consideration of these functions involves the study of the basic constitutional doctrines of due process, police power, full faith and credit, obligation of contract, privileges and immunities, equal protection, intergovernmental immunities, commerce among the states, and separation of powers. Although emphasis is thus upon federal constitutional law, similarities in constitutional doctrine together with occasional reference to doctrines unique to the States, serve to provide as well a background training in state constitutional law.

Material to be announced.

Contracts. Nine credit hours. Three credit hours each Quarter. Autumn, Winter, Spring.

Offer and acceptance, consideration, third party beneficiaries, assignments, joint rights and duties, statute of frauds, performance of contracts, conditions precedent and subsequent, impossibility, illegal contracts, and discharge.

Corbin, Cases on Contracts.

Jurisprudence. Three credit hours. Autumn Quarter.

A study of judicial reasoning based on a survey of prevailing legal philosophies. Selected materials and cases.

Legal Method and Personal Property. Three credit hours. Autumn Quarter.

Wherein cases on Personal Property are used both to present the substantive law of that subject (possession, finders, lien, pledge and acquisition of ownership) and to illustrate various philosophies of law, the use of judicial logic and the doctrine of precedent.

Bigelow's Cases on Personal Property, Second Edition.

Mortgages. Three credit hours. Spring Quarter.

Nature and elements of a mortgage, legal and equitable, real and personal; incidents of the mortgage relation, right to possession and remedies of the mortgagee; discharge by payment, tender and merger; subrogation; assignments; redemption; foreclosure; extent of the lien, priorities between liens and competing claimants; and conveyance of the equity of redemption.

Casebook to be announced.

Municipal Corporations. Three credit hours. Winter Quarter.

Nature, creation and control; nature of ordinances, power, home rule; initiative and referendum.

Seasongood, Cases on Municipal Corporations.

Negotiable Instruments. Four credit hours. Winter Quarter.

Types of Commercial or Negotiable paper; transfer; purchase and payment in due course, discount and security.

Steffen, Cases on Commercial and Investment Paper.

Private Corporations. Six credit hours. Three hours, Autumn Quarter; three hours, Winter Quarter.

A consideration of the business corporation as a device for the furtherance of trade and of manufacturing, with emphasis upon the law of corporate finance and upon problems of present-day importance. More specifically, the course is a study of the formation of corporations; the separate corporate capacity or entity privilege and its limitations; the criminal and tort liability of corporations; directors and management; rights and liabilities on contracts as effected by the statement of corporate purposes in the articles; rights and powers of shareholders; issue of shares and subscriptions, underwriting, marketing of securities; stock structure and classes of shares; capital requirements and declaration of dividends; redemption of shares; reduction of legal capital; liabilities of shareholders, directors, and promoters to the corporation and to creditors in connection with the issue of shares; transfer of shares (rights and liabilities of the corporation, transferor and transferee); fundamental changes in the corporate organization; minority rights; and shareholders' actions.

Ballantine and Lattin's Cases and Materials on Corporations.

Real Property and Wills. Nine credit hours. Three credit hours each Quarter. Autumn, Winter, Spring.

A study of interests in land and their acquisition and transfer. The course covers the following topics: Possessory Interests; Martial Interests; Concurrent Interests; Future Interests; Easements and Licenses; Modification of Interests by Covenants; Modification of Interests by Legislation; Adverse Possession; Intestacy; Wills, Conveyances (Deeds, Mortgages, and Leases); The Recording System; Title Registration.

Martin's Cases and Materials on the Law of Real Property, 1943.

Sales. Three credit hours. Spring Quarter.

Transfer of title to personal property as a result of contract; rules for determining intent as to relative time of its transfer; different types of sales; documents of title; obligations of seller and buyer as to warranties; delivery and payment, inspection, acceptance; rights of unpaid seller.

Casebook to be announced.

MANUAL ARTS

(See Education)

LINGUISTIC STUDIES

ADVISORY COMMITTEE: PROFESSORS SPERBER (CHAIRMAN) AND SCHUTZ, ASSOCIATE PROFESSORS ABBOTT AND UTLEY

Graduate instruction in linguistics is offered in Classics, English, German, and Romance Languages. An advisory Committee coordinates the different phases of instruction. Students are encouraged to formulate interdepartmental programs of study and research and to provide a broad and adequate foundation for scholarship. In selecting a topic for a thesis or a dissertation a student should carefully consider the specialized research interests of the instructor with whom he expects to work. The following summary of courses indicates the opportunities for graduate study in this field. A more detailed description of each of these courses will be found under the appropriate departmental announcements.

CLASSICS

Latin and Greek

627. Vulgar Latin. Mr. Abbott.

720. Introduction to Historical Greek and Latin Grammar. Mr. Abbott.

721-722. Historical Greek and Latin Grammar. Mr. Abbott.

ENGLISH

625. Standards of English Usage. Mr. Estrich.

627. The Language We Speak. Mr. Utley.

701. Minor Problems in English. English Language. Mr. Utley, Mr. Estrich.

746. Middle and Modern English. Mr. Utley.

751. Language and Literature of the Anglo-Saxons. Mr. Estrich.

GERMAN

656. Introduction to the Historical Study of German. Mr. Sperber.

673. Elementary Middle High German. Mr. Sperber.

675. Elements of Semantics. Mr. Sperber.

705. Principles of the Historical Study of Language. Mr. Sperber.

801. Advanced Middle High German. Mr. Sperber.

805. Gothic. Mr. Sperber.

810. Old High German. Mr. Sperber.

870. Seminar in German Linguistics. Mr. Sperber.

ROMANCE LANGUAGES

French

623. French Pronunciation and Diction.

628. Modern French Syntax. Mr. Schutz.

801-802. Introduction to Old French Linguistics. Mr. Schutz, Mr. Moore.

803-804. Old Provençal. Mr. Schutz.

Spanish

617. Modern Spanish Syntax. Mr. Anibal.

620. Spanish Pronunciation and Diction.

805-806. Old Spanish. Mr. Hendrix.

MATHEMATICS

Office, 306 University Hall

PROFESSORS SYNGE, KUHN (EMERITUS), RASOR (EMERITUS), MORRIS (EMERITUS), BLUMBERG, RADO AND BAMFORTH, ASSOCIATE PROFESSOR MANN, ASSISTANT PROFESSORS BAREIS, BEATTY, CARIS, RICKARD, WYLIE, JONES, ALBERT AND MICKLE

Any student desiring to work for a graduate degree in the Department of Mathematics should consult the general regulations of the Graduate School in this Bulletin. The following requirements supplement the general regulations:

Prerequisites for Graduate Work: Graduate work in mathematics presupposes satisfactory completion of the equivalent of 45 Quarter hours in college mathematics. If this requirement is not met at the time of admission, the deficiency is made up in excess of the regular requirements. It is desirable, but not required, that students should also have a background in physics, engineering, or other fields in which mathematics is used.

Requirements for the Master's degree: (a) In accordance with general requirements, 45 Quarter hours of work are required in residence. Of these 45 hours, 5 hours may be credited for the thesis; not more than 20 hours may be credited in "600" courses except in special cases. (b) A reading knowledge of French and German is desirable, but is not a fixed requirement.

Requirements for the degree of Doctor of Philosophy: (a) Initial requirements are a Master's degree in mathematics or 45 Quarter hours credit on the graduate level. When these requirements are met, a general course of study is approved by the Departmental Committee on Graduate Degrees. In addition to initial requirements mentioned above, a student should have at least 40 Quarter credit hours in the more advanced graduate courses to provide a good general background and adequate specialized knowledge as a basis for the dissertation. (b) The student should meet the language requirement as early as possible. The normal language requirement is a dictionary reading knowledge of French and German. (c) The general examination must be taken at least three Quarters before the student expects to come up for the degree. (d) When the language requirement has been met and the general examination passed, the student is eligible for admission to candidacy for the doctorate.

Graduate Mathematics Club. The membership consists of the staff and the graduate students. The meetings, held fortnightly, are devoted to the presentation of original investigations, as well as reports on mathematical literature and pedagogy. On application to the Department office, advance notices of meetings will be sent to all who may be interested.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46. These general prerequisites include an acceptable course in calculus.

601. Advanced Calculus. Five credit hours. Autumn Quarter. General prerequisites must include one year of calculus. Mr. Mickle.

The theory of limits, functions, continuity; definition and meaning of ordinary and partial derivatives; difinition of definite integrals, proper and improper; fundamental theorem of the integral calculus; functions defined as integrals containing a parameter; mean value theorems; congerence of series; power series; implicit functions.

607. Introduction to the Theory of Functions of a Complex Variable. Five credit hours. Winter Quarter. General prerequisites must include Mathematics 601. Mr. Radó.

The primary purpose of this course is to acquaint the student with fundamental facts about analytic and harmonic functions that are indispensable in applied mathematics. Topics discussed include power series expansions, the formula of Cauchy, residues, conformal mapping, elementary functions in the complex domain.

608. Advanced Engineering Mathematics I. Three credit hours. Autumn Quarter. Mr. Wylie.

Ordinary differential equations with constant coefficients with applications. Determinants. Numerical solution of algebraic equations.

609. Advanced Engineering Mathematics II. Three credit hours. Winter Quarter. General prerequisites must include Mathematics 608 or its equivalent. Mr. Wylie.

Fourier series, Bessel functions, graphical and numerical methods of solving differential equations, dimensional analysis.

610. Advanced Engineering Mathematics III. Three credit hours. Spring Quarter. General prerequisites must include Mathematics 609 or its equivalent Mr. Wylie.

Vector analysis, complex numbers, elements of operational calculus.

611. Differential Equations. Five credit hours. Winter Quarter.

Equations of first and second orders: linear equations with constant coefficients; solutions in series; numerical approximations; the existence theorem of Picard; systems of ordinary equations; the Legendre and Bessel equations with certain applications.

***617. Introduction to Modern Mathematics.** Five credit hours. Autumn Quarter. Mr. Blumberg.

The purpose of this course is to introduce the student to some of the important conceptions and methods developed in Mathematics during the past century. Illustrative material will be selected from such fields as graphical and numerical methods, projective geometry, the theory of the irrational, point sets, groups, probability and relativity.

621. Advanced Geometry. Five credit hours. Autumn Quarter. Miss Jones.

Geometric constructions; points, lines and circles associated with a triangle; harmonic ranges and pencils; harmonic properties of the circle; radical axis; pole and polar with respect to a circle; inversion; symmedian points; Brocard points. This is chiefly a problem course in the field of plane geometry, and is of special value to teachers of this subject.

†623. Projective Geometry. Five credit hours. Spring Quarter. Mr. Blumberg.

Plücker line coordinates, duality, infinite elements, projection, double ratio, projective coordinates in one and two dimensions, projective transformations, collineations and involutions in one dimension, projective properties of conics.

***625. Solid Analytical Geometry.** Five credit hours. Autumn Quarter.

Systems of co-ordinates; planes and lines; types of surfaces; quadric surfaces; quality.

641. Theory of Equations. Five credit hours. Winter Quarter. Mr. Mickle.

Algebraic solution of cubic and quartic equations; approximate determination of irrational roots of polynomials by Horner's and Newton's methods; isolation of roots by method of Sturm; theory of determinants and applications to linear equations; constructions by ruler and compass; symmetric functions; elementary treatment of real and complex numbers.

***651. Fundamental Ideas in Algebra and Geometry.** Three credit hours. Autumn Quarter.

The aim of this course is to provide a suitable mathematical background for teachers and prospective teachers of secondary school mathematics. The content will include a discussion of rational numbers, real numbers, complex numbers, and finite fields; finite groups, theory of numbers; number scales; empirical and historical development of algebraic and geometric facts; undefined elements; types of assumptions used in algebra and gometry; Euclidean geometry, and certain non-Euclidean geometries.

***652. Fundamental Ideas in Algebra and Geometry.** Three credit hours. Winter Quarter. General prerequisites must include Mathematics 651 or the permission of the instructor.

A continuation of Mathematics 651.

***653. Fundamental Ideas in Algebra and Geometry.** Three credit hours. Spring Quarter. General prerequisites must include Mathematics 652 or the permission of the instructor.

A continuation of Mathematics 652.

† Not given during the academic year, 1946-1947.
* Not given in 1946-1947.

661. Vector Analysis. Five credit hours. Spring Quarter. General prerequisites must include Mathematics 601 and a course in physics, or the equivalent.

The algebra and calculus of vectors; applications to mechanics. Partial differential operators, transformation theorems for integrals. An introduction to the theory of the electrostatic potential.

***655. Applied Mathematics I.** Five credit hours. Autumn Quarter. General prerequisites must include Mathematics 601 and 611 or permission of the instructor. For engineering students the prerequisites are Mathematics 608 and 609 and Mechanics 601 and 607. Mr. Synge.

Statics and dynamics in two dimensions, including friction, thin beams, cables, frames, projectiles, oscillators, planetary orbits, motion of a rigid body parallel to a plane, vibrations, stability, impulsive motion. Emphasis is placed on the logical structure of mechanics and the application of general laws.

Not open to students who have credit for Mathematics 711.

***656. Applied Mathematics II.** Five credit hours. Winter Quarter. General prerequisites must include Mathematics 655. Mr. Synge.

Statics and dynamics in space, including reduction of general force-systems, work and potential-energy, theory of moments of inertia, vector methods in dynamics of particles and rigid bodies, impulsive motion, spherical pendulum, motion of a particle in electromagnetic field, effects of the earth's rotation.

Not open to students who have credit for Mathematics 712.

***657. Applied Mathematics III.** Five credit hours. Spring Quarter. General prerequisites must include Mathematics 656. Mr. Synge.

Gyroscopic theory and general motion of a rigid body in space. Mechanics in the special theory of relativity. Generalized coordinates. Lagrange's equations for holonomic and non-holonomic systems, theory of small oscillations, minimal principles, Hamilton's equations.

Not open to students who have credit for Mathematics 713.

692. Finite Differences. Five credit hours. Winter Quarter. Given in alternate years. General prerequisites must include Mathematics 601 and 611. Mr. Mann.

An introduction to finite differences; development of the more important methods of interpolation and summation.

700. Minor Problems. One to five credit hours. Autumn, Winter, and Spring Quarters.

This course consists of conferences, assigned readings, and reports for minor investigations.

701-702-703. Introduction to Analysis. Five credit hours. Autumn, Winter, and Spring Quarters. Mr. Bamforth.

The main objective is to train the student to comprehend, and apply intelligently in problems, various basic notions and methods of analysis. The subject matter is chosen from such topics as point sets, the real continuum, infinite series and products, graphical and numerical computation, measure, Riemann integral, curvilinear and multiple integrals, implicit functions, Fourier series.

Not open to students who have credit for Mathematics 831-832-833.

721. Mathematical Methods in Science I. Five credit hours. Autumn Quarter. General prerequisites must include Mathematics 601, 611, 661 or Mathematics 608, 609, 610, or permission of the instrutor.

Fourier Series, Bessel functions, Bessel-Fourier Series and their application to the solution of boundary value problems associated with some of the partial differential equations of physics. Miscellaneous physical problems involving Bessel functions.

722. Mathematical Methods in Science II. Five credit hours. Winter Quarter. General prerequisites must include Mathematics 721.

Legendre functions, spherical harmonics, Fourier integrals, Fourier transforms and their application to the solution of boundary value problems associated with some of the partial differential equations of physics and engineering.

* Not given in 1946-1947.

723. Mathematical Methods in Science III. Five credit hours. Spring Quarter. General prerequisites must include Mathematics 722 or permission of the instructor.

Theory of potential, including equations of Laplace and Poisson in two and three dimensions; single and double layers, Green's function, uniqueness theorems, outline of fundamental existence theorems. The Rayleigh-Ritz method.

731. Probability and Statistics. Five credit hours. Autumn Quarter. General prerequisites must include Mathematics 601. Mr. Mann.

Combinatorial probability. Non-parametric tests. The binomial, multinomial, and Poisson distribution laws. Distribution functions. Riemann-Stieljes integrals. Moments and characteristic function. The limit theorems of probability. Derivations of the distrbuton of test statstics. Applications.

732. Theory of Statistical Inference. Five credit hours. Winter Quarter. General prerequisites must include Mathematics 731. Mr. Mann.

Theory of testing hypotheses and estimation. The power of a test. Most powerful and asymptotically most powerful tests. Maximum likelihood estimates, consistency, sufficiency and efficiency of an estimate. Methods of least squares. Statistcial inference from non-experimental data.

733. Statistics: Design and Analysis of Experiments. Five credit hours. Spring Quarter. General prerequisites must include Mathematics 732. Mr. Mann.

The analysis of variance distribution. Likelihood ratio tests. Tests of linear hypothesis. Analysis of variance in an r-ray classification. Non-orthogonal data. Randomized blocks. Latin squares, incomplete balanced blocks, lattices and lattice squares.

741-742-743. Introduction to Higher Geometry. Five credit hours each. Autumn, Winter, and Spring Quarters. General prerequisites must include Mathematics 601 or permission of the instructor. Mr. Radó.

The purpose of this course is to acquaint the student with some of the fundamental aspects of metric differential geometry in three-space, topology, and projective geometry. The following topics will be stressed: Frenet formulas, curvatures of surfaces, geodesics, minimal surfaces, elements of line geometry. Metric spaces, characterization of metrizable spaces, structure theory of Peano spaces, elements of combinatorial topology. Synthetic and analytic methods in projective geometry, relations between algebraic fields and various types of projective geometries, elements of non-Euclidean geometries.

751. Tensor Analysis. Three credit hours. Spring Quarter. General prerequisites must include Mathematics 601 or permission of the instructor. Mr. Synge.

This course gives the basic ideas and techniques required for the application of tensors in Riemannian geometry, theory of relativity and classical mechanics. The following topics are included: covariance and contravariance, geodesics and geodesic null-lines; curvature tensor; Ricci; tensor, geodesic deviation, space of constant curvature, Cartesian tensors.

Not open to students who have credit for Mathematics 823.

752. Introduction to the Theory of Relativity. Five credit hours. Spring Quarter. General prerequisites must include permission of the instructor. Mr. Blumberg.

Historical sketch; the Lorentz group; dynamics of Special Relativity; tensors; significant features of General Relativity.

Not open to students who have credit for Mathematics 671.

***761. Introduction to Higher Algebra I.** Five credit hours. Autumn Quarter. General prerequisites must include permission of the instructor.

Elementary theory of numbers; congruences; binary forms; continued fractions; groups; fields; invariants; Galois fields; algebraic fields.

***762. Introduction to Higher Algebra II.** Five credit hours. Winter Quarter. General prerequisites must include Mathematics 761.

A continuation of Mathematics 761.

* Not given in 1946-1947.

*763. Introduction to Higher Algebra III. Five credit hours. Spring Quarter. General prerequisites must include permission of the instructor. Mr. Bamforth.

Theory of matrices, quadratic forms. Hermitian quadratic forms, characteristic numbers of forms, elementary divisors, invariant factors, introductions to the theory of algebraic numbers.

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Education, Course 687.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

NOTE: Students should consult with instructors before registering for courses open only to graduates.

*801-*802-*803. Theory of Functions of a Complex Variable. Three credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include Mathematics 601 or permission of the instructor. Mr. Radó.

The complex number system. Analytic functions. Theorems of Cauchy and Goursat. Expansions. Singularities. Special functions. Conformal mapping. Harmonic and subharmonic functions. The theorem of Picard and related topics.

804-805-806. Point Sets and Real Functions. Three credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include Mathematics 833 or permission of the instructor. Mr. Blumberg.

A development of the major ideas from the simplest to those considered in current literature. The principal aim is the comprehension of the motivating principles for asking and answering questions in this field. The content comprises the theory of infinite cardinals and ordinals, descriptive and metric properties of sets, the Lebesgue integral, and diverse applications to the theory of real functions.

807-808-809. Ordinary and Partial Differential Equations. Three credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include Mathematics 833 or permission of the instructor. Mr. Bamforth.

Existence theorems; properties of solutions depending upon initial conditions and parameters; geometrical properties of solutions; dynamical systems; stability of solutions; linear differential equations. Applications to problems in engineering, physics, chemistry.

*810-*811-*812. Calculus of Variations. Three credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include Mathematics 833 or permission of the instructor. Mr. Radó.

Formulation of typical problems; classical necessary conditions; the Jacobi condition and the criteria for conjugate points due to Bliss; imbedding theorems and the Weierstrass sufficiency proof; the Hamilton-Jacobi theory; double integral problems; inverse problems and direct methods in the calculus of variations; applications in engineering, physics, and Riemannian geometry.

*813-*814. Mathematical Methods in Theoretical Physics. Three credit hours. Autumn and Winter Quarters. General prerequisites must include Mathematics 601 or permission of the instructor. Mr. Bamforth.

This course aims to discuss from a mathematical point of view topics which are fundamental in the study of modern theoretical physics, such as matrices, quadratic and Hermitian quadratic forms, integral equations, singular points of ordinary differential equations, confluence of singularities, asymptotic expansions.

†816. Fourier Series and Spherical Harmonics. Three credit hours. Spring Quarter. General prerequisites must include Mathematics 601 or permission of the instructor.

Convergence, summability, integration and differentiation of Fourier's Series, expansions of functions in terms of Legendre Polynomials, and surface spherical harmonics; applications to physics.

* Not given in 1946-1947.

† Not given during the academic year 1946-1947.

***818. Infinite Series and Products.** Three credit hours. Spring Quarter. General prerequisites must include permission of the instructor. Mr. Blumberg.

This course includes selections from the following topics: theories of irrationals; series of positive terms; convergence tests; general series; double series; transformation of series; infinite products; Fourier, Dirichlet, and power series; special series; divergent series.

***820. Integral Equations.** Three credit hours. Spring Quarter.

Existence theorems for characteristic numbers and characteristic solutions of integral equations; expansion theorems; relation between integral equations and boundary-value problems in differential equations.

***825. Partial Differential Equations.** Three credit hours. General prerequisites must include permission of the instructor. Mr. Bamforth.

A study of partial differential equations of the first and second order, with special attention to the various applications to geometry and physics.

***841-*842-*843. Differential Geometry.** Three credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include Mathematics 743 or permission of the instructor. Mr. Radó.

Review of fundamental notions. Applications of the general theory to special problems, in particular to problems in the large and to variation problems arising in connection with length, area, volume, curvature.

851. Hydrodynamics. Three credit hours. Autumn Quarter. General prerequisites must include permission of the instructor. Mr. Synge.

This course develops the fundamental equations of hydrodynamics with application to airfoil theory in view. Topics include methods of Euler and Lagrange, stream lines, vorticity and irrotational motion, Bernoulli's theorem, vortex tubes and filaments, derivation of formulas for lift and moment on an airfoil.

852. Elasticity. Three credit hours. Winter Quarter. General prerequisites must include permission of the instructor. Mr. Synge.

This course develops the basic general equations of elasticity and applies them to problems which have exact or approximate mathematical solutions. Topics include stress and strain, equations of equilibrium and compatibility, plane strain and generalized plane stress; applications to tube and shell under pressure, bending of beams, torsion and flexure.

853. Mechanics of Continua. Three credit hours. Spring Quarter. General prerequisites must include permission of the instructor. Mr. Synge.

Topics in hydrodynamics and elasticity not covered in the preceding courses, such as motion of viscous fluids, airfoil of finite span, general motion of a solid in a fluid, strain-energy and elastic symmetry, equilibrium and vibrations of rods and plates.

***861. Theory of Fields.** Three credit hours. Autumn Quarter. General prerequisites must include Mathematics 763. Mr. Radó.

Steinitz's theory of fields.

***862. Theory of Matrices.** Three credit hours. Winter Quarter. General prerequisites must include Mathematics 861.

Advanced topics in the theory of matrices with particular attention to matrices with integral elements.

***867. Linear Algebras.** Three credit hours.

A study of linear algebras and their arithmetics, with particular attention to Dickson's theory of hypercomplex integers.

***868. Theory of Ideals.** Three credit hours.

Ideal theory of commutative and non-commutative rings.

871-872. Finite Groups. Three credit hours. Autumn and Winter Quarters. Mr. Hall.

Fundamentals of the theory of finite groups; the abstract, permutation, and linear groups; the Galois theory of equations; applications.

***874. Continuous Groups.** Three credit hours.

A study of Lie's theory of r-parameter continuous groups with an introduction to some of the recent investigations of Cartan and Weyl.

* Not given in 1946-1947.

*891. Advanced Statistics. Three credit hours. Spring Quarter. General prerequisites must include Mathematics 696.

Small sample theory and its applications to statistical problems.

950. Research in Mathematics. Autumn, Winter, and Spring Quarters. Library work and conferences. General prerequisites must include permission of the Department of Mathematics.

MECHANICAL ENGINEERING

Office, 247 Robinson Laboratory

PROFESSORS MARQUIS, NORMAN, BROWN, BUCHER, STINSON, BEITLER, AND MOFFAT, ASSOCIATE PROFESSORS ROBERTS AND MARCO, ASSISTANT PROFESSOR LINDAHL

Prerequisites for Graduate Work: For major work a student must hold a baccalaureate degree in mechanical engineering or its equivalent and his application must be approved by the department's committee on graduate work. A student desiring to work for a Master's degree in this field must have at least a 2.5 point-hour ratio for all his undergraduate work and a 2.75 point-hour ratio in the mechanical engineering courses, on the basis of the grading system at this University. A student having lower point-hour ratios may be permitted to work toward a Master's degree if the department's committee on graduate work judges that there are extenuating circumstances.

The application of a student desiring to work for the degree Doctor of Philosophy in this field must be approved by the department's committee on graduate work when he has received the Master's degree, or after he has received the approval of the Graduate Council in case part of the work is done elsewhere than in this University.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading "DEPARTMENTS OF INSTRUCTION," page 46.

These general prerequisites include fundamental courses in mathematics, physics, and mechanics.

The following courses do not carry graduate credit for students who received the degree of Bachelor of Mechanical Engineering from The Ohio State University: 607, 608, 609, 611, 615, 625, 627, 664, 665, 710, 727, 728, 742, 744, 779, 780, and 781.

*601. Thermodynamics. Five credit hours. One Quarter. Autumn, Winter, Spring. Five recitations each week. Mr. Marquis, Mr. Bucher, Mr. Lindahl.

The beginning of a study of engineering thermodynamics; an analytical study of laws which govern energy transformation.

*602. Thermodynamics. Five credit hours. One Quarter. Autumn and Spring. Five recitations each week. General prerequisites must include Mechanical Engineering 601. Mr. Beitler.

The continuation of Mechanical Engineering 601 including fluid flow.

*603. Steam Power Engineering. Three credit hours. Autumn Quarter. Three recitations each week. General prerequisites must include Mechanical Engineering 602 and 606. Mr. Marquis, Mr. Bucher.

A descriptive and analytical study of steam-generating and steam-using equipment.

*606. Combustion. Four credit hours. Spring Quarter. Four recitations each week. General prerequisites must include Mechanical Engineering 601.

A study of the utilization of fuels.

607. Heat-Power Engineering. Five credit hours. Autumn Quarter. Five recitations each week. General prerequisites must include a course in engineering drawing and three Quarters of elementary chemistry. Mr. Marquis, Mr. Bucher, Mr. Lindahl.

The beginning of a study of thermodynamics, and of an analytical and descriptive study of steam-generating and steam-using machinery, and of air compression and refrigeration.

* Not given in 1946-1947.

608. **Heat-Power Engineering.** Five credit hours. Winter Quarter. Five recitations each week. General prerequisites must include Mechanical Engineering 607. Mr. Marquis, Mr. Bucher, Mr. Lindahl.

The continuation of Mechanical Engineering 607.

609. **Heat-Power Engineering.** Three credit hours. Spring Quarter. Three recitations each week. General prerequisites must include Mechanical Engineering 608. Mr. Marquis, Mr. Bucher, Mr. Lindahl.

The continuation of Mechanical Engineering 608.

611. **Heat Transmission.** Three credit hours. Spring Quarter. Three recitations each week. General prerequisites must include Mechanical Engineering 608. Mr. Brown, Mr. Marco.

Study of the fundamental laws of heat transmission as applied to engineering.

612. **Machine Design.** Four credit hours. One Quarter. Autumn and Winter. Four recitations each week. General prerequisites must include Mechanics 602. Mr. Moffat, Mr. Marco.

A detailed course of study of the principles of mechanics and strength of materials applied to the design and construction of machinery.

613. **Machine Design.** Five credit hours. One Quarter. Winter and Spring. Three recitations and two three-hour laboratory periods each week. General prerequisites must include Mechanical Engineering 612. Mr. Moffat, Mr. Marco.

Continuation of Mechanical Engineering 612.

615. **Mechanism.** Five credit hours. Autumn Quarter. Three recitations and two three-hour laboratory periods each week. General prerequisites must include a course in engineering drawing. Mr. Stinson, Mr. Moffat.

A classroom and drawing-board study of mechanisms and kinematics of machines.

617. **Mechanical Engineering Laboratory.** Four credit hours. Autumn Quarter. Two recitations and one four-hour laboratory period each week. General prerequisites must include Mechanics 610 and Metallurgy 651. Mr. Beitler, Mr. Robinson.

Lecture and recitations on pressure and temperature measurements, on steam engines and turbines, and on boilers and combustion. Laboratory work in the calibration of pressure gauges and indicator springs; testing of steam engines, pumps and boilers.

625. **Internal Combustion Engines.** Three credit hours. Spring Quarter Three recitations each week. General prerequisites must include Mechanical Engineering 608 and 615. Mr. Stinson, Mr. Roberts.

A study of internal combustion engines, turbines and their auxiliaries.

*626. **Internal Combustion Engines and Turbines.** Four credit hours. Autumn Quarter. Four recitations each week. For students not majoring in Mechanical Engineering. General prerequisites must include Mechanical Engineering 601. Mr. Stinson, Mr. Roberts.

A study of internal combustion engines, turbines and their auxiliaries.

627. **Materials of Engineering.** Five credit hours. Winter Quarter. Five recitations each week. General prerequisites must include three Quarters of elementary chemistry. Mr. Moffat, Mr. Marco.

A study of the production and properties of the materials used in engineering structures and machinery.

*640. **Human Aspects of Engineering.** Four credit hours. Spring Quarter. Four recitations each week. Mr. Norman.

An introduction to industrial hygiene, safety and worker efficiency; the interrelation of engineering and social situations and ideas.

664. **Mechanical Engineering Laboratory.** Three credit hours. Winter Quarter. One five-hour laboratory period each week. General prerequisites

* Not given in 1946-1947.

must include Mechanical Engineering 607; Mechanics 610, Mechanics 602 and Mechanical Engineering 608 must be taken previously or concurrently. Mr. Bucher, Mr. Roberts, Mr. Marco, Mr. Lindahl, Mr. Robinson.

The calibration and use of instruments for measurement of temperature, pressure, speed and power.

665. Mechanical Engineering Laboratory. Three credit hours. Spring Quarter. One five-hour laboratory period each week. General prerequisites must include Mechanical Engineering 608 and 664. Mechanical Engineering 609 and Mechanics 607 must be taken previously or concurrently. All instructors.

Experiences in methods of mechanical engineering laboratory procedure and instruction in engineering report wroting.

***666. Mechanical Engineering Laboratory.** Two credit hours. Winter Quarter. One four-hour laboratory period each week. For students not majoring in Mechanical Engineering. General prerequisites must include Mechanical Engineering 664 and 626. All instructors.

A study of the performance of internal combustion engines and auxiliaries.

673-674. Mechanical Engineering Laboratory. Four credit hours. Autumn and Winter Quarters. Two recitations and one four-hour laboratory period. General prerequisites must include Mechanics 610. All instructors.

Study of the flow of fluids, applied hydraulics and heat-power engineering; laboratory exercises in related subjects.

703. Aeronautical and Automotive Power Plants. Three credit hours. Autumn Quarter. Three recitations each week. General prerequisites must include Mechanics 602 and 607, and Mechanical Engineering 625 or 674. Mr. Stinson.

A descriptive and analytical study of automotive and aeronautical power plants and auxiliaries.

704-705. Automotive Engineering. Three credit hours. Winter and Spring Quarters. Three recitations each week. General prerequisites must include Mechanical Engineering 625 or 703. Mr. Stinson.

An advanced study of automotive engines, chassis and auxiliaries.

710. Heating, Ventilating, and Air Conditioning. Four credit hours. Autumn Quarter. Four recitations each week. General prerequisites must include Mechanical Engineering 611. Mr. Brown, Mr. Marco, Mr. Lindahl.

Study of the heating and cooling requirements of buildings and of the mechanical equipment used for heating, ventilating and air conditioning.

***716. Refrigeration and Air Conditioning.** Three credit hours. Spring Quarter. Three recitations each week. General prerequisites must include Mechanical Engineering 710. Mr. Brown.

A study of the mechanical processes and of the machinery used in refrigeration, and of the methods and equipment used for controlling conditions of air for comfort, health, and industrial purposes.

725. Diesel Engines. Three credit hours. Spring Quarter. Three recitations each week. General prerequisites must include Mechanical Engineering 625 or 704. Mr. Stinson.

An advanced study of Diesel-engine design, operation and economics.

***726. Gas Turbines and Jet Propulsion.** Three credit hours. Winter Quarter. Three recitations each week. General prerequisites must include Mechanical Engineering 625 or 626. Mr. Norman, Mr. Stinson.

A descriptive and analytical study of stationary and mobile gas turbine plants including superchargers and jet propulsion.

* Not given in 1946-1947.

727. Machine Design. Five credit hours. Autumn Quarter. Five recitations each week. General prerequisites must include Mechanics 602 and 605 or 607. Mechanical Engineering 609 and 615 or a course in engineering drawing. Mr. Norman, Mr. Marco.

A study of the principles and methods applied to the design and construction of machinery.

728. Machine Design. Five credit hours. Winter Quarter. Three recitations and two three-hour laboratory periods each week. General prerequisites must include Mechanical Engineering 727. Mr. Norman, Mr. Marco.

The continuation of Mechanical Engineering 727.

***737. Machine Design.** Four credit hours. One Quarter. Autumn and Winter. Four recitations each week. General prerequisites must include Mechanics 602. Mr. Moffat, Mr. Marco.

A study of the principles and methods applied to the design and construction of machinery.

Not open to students majoring in Mechanical Engineering.

***738. Machine Design.** Three credit hours. One Quarter. Winter and Spring. Three recitations each week. General prerequisites must include Mechanical Engineering 737. Mr. Moffat, Mr. Marco.

A continuation of Mechanical Engineering 737.

Not open to students majoring in Mechanical Engineering.

***739. Machine Design Laboratory.** Two credit hours. One Quarter. Winter and Spring. Two three-hour laboratory periods each week. General prerequisites must include Mechanical Engineering 738. Mr. Moffat, Mr. Marco.

Design Problems in connection with Mechanical Engineering 738.

Not open to students majoring in Mechanical Engineering.

742. Hydraulic Machinery. Three credit hours. Winter Quarter. Three recitations each week. General prerequisites must include Mechanics 610 and Mechanical Engineering 609, 617, or 673. Mr. Beitler, Mr. Lindahl.

The application of hydraulic principles to hydraulic machinery.

743. Machine Design. Three credit hours. Spring Quarter. Three recitations each week. General prerequisites must include Mechanical Engineering 728. Mr. Norman, Mr. Marco.

The continuation of Mechanical Engineering 728.

744. Machine Design. Five credit hours. Spring Quarter. Three recitations and two three-hour laboratory periods each week. General prerequisites must include Mechanical Engineering 728. Mr. Norman, Mr. Marco.

The continuation of Mechanical Engineering 728.

***745. Steam Power Plants.** Three credit hours. Winter Quarter. Three recitations each week. General prerequisites must include Mechanical Engineering 603. Mr. Marquis, Mr. Bucher.

A continuation of Mechanical Engineering 603.

***754. Hydraulic Power Generation.** Three credit hours. Winter Quarter. Three recitations each week. General prerequisites must include Mechanical Engineering 742 or 674 or permission of the instructor. Mr. Beitler, Mr. Lindahl.

A descriptive, analytical and economic study of hydraulic power plants and their equipment.

779. Mechanical Engineering Laboratory. Three credit hours. Autumn Quarter. One four-hour laboratory period each week. General prerequisites must include Mechanical Engineering 609, 625, and 665. All instructors.

Tests of mechanical engineering equipment.

* Not given in 1946-1947.

780. **Mechanical Engineering Laboratory.** Three credit hours. Winter Quarter. One four-hour laboratory period each week. General prerequisites must include Mechanical Engineering 665. All instructors.

Advanced mechanical engineering laboratory.

781. **Mechanical Engineering Laboratory.** Three credit hours. Spring Quarter. One four-hour laboratory period each week. General prerequisites must include Mechanical Engineering 665. All instructors.

Advanced mechanical engineering laboratory.

799. **Special Problems in Advanced Mechanical Engineering.** Two to ten credit hours. Autumn, Winter, and Spring Quarters. All instructors.

This course is intended to give the advanced student opportunity to pursue special studies not offered in the fixed curriculum. Work undertaken will be selected from aeronautical engition, steam turbines, internal combustion engines, gas turbines, jet propulsion and other problems in Advanced Mechanical Engineering. A student may repeat this course until he has obtained a maximum of 24 credit hours. He may accumulate not more than ten credit hours in any one of the above subdivisions.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

These prerequisites include a collegiate course in mechanics, strength of materials, machine design, steam or gas engines and knowledge of the fundamentals of hydraulics.

810. **Internal Combustion Power Plants.** Three credit hours. Autumn Quarter. Three class hours each week. General prerequisites must include Mechanical Engineering 625 or equivalent. Mr. Stinson, Mr. Roberts.

An advanced study of Internal Combustion Power Plants.

811. **Internal Combustion Power Plants.** Three credit hours. Winter Quarter. Three class hours each week. General prerequisites must include Mechanical Engineering 810 or equivalent. Mr. Stinson, Mr. Roberts.

A continuation of Mechanical Engineering 810.

812. **Advanced Internal Combustion Power Plant Problems.** Credit hours to be arranged. Autumn, Winter, and Spring Quarters. The work includes conferences, library, drawing board and laboratory work. Mr. Stinson, Mr. Roberts.

820. **Refrigeration.** Three credit hours. Autumn Quarter. Three class hours each week. General prerequisites must include Mechanical Engineering 710 or equivalent. Mr. Brown.

A study of the theory and practice of refrigeration.

821. **Air Conditioning.** Three credit hours. Winter Quarter. Three class hours each week. General prerequisites must include Mechanical Engineering 710 or equivalent. Mr. Brown.

An advanced study of the principles of air conditioning.

822. **Advanced Heating, Ventilating and Air Conditioning Problems.** Credit hours to be arranged. Autumn, Winter, and Spring Quarters. The work includes conference, library, drawing board and laboratory work. Mr. Brown.

830. **Steam Turbines.** Three credit hours. Autumn Quarter. Three class hours each week. General prerequisites must include Mechanical Engineering 603 or equivalent. Mr. Marquis, Mr. Bucher.

A study of steam turbines and auxiliaries.

831. **Advanced Steam Power Plants.** Three credit hours. Winter Quarter. Three class hours each week. General prerequisites must include Mechanical Engineering 830 or equivalent. Mr. Marquis, Mr. Bucher.

Advanced study of Steam Power Plants.

832. Advanced Steam Power Plant Problems. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. The work includes conferences, library, drawing board and laboratory work. Mr. Marquis, Mr. Bucher.

840. Advanced Machine Design Analysis. Three credit hours. Autumn Quarter. Three class hours each week. General prerequisites must include Mechanical Engineering 727 or equivalent. Mr. Marco.

The application of modern theories of failure, such as fatigue and creep, to the determination of safe working stresses.

841. Dynamics of High Speed Machinery. Three credit hours. Winter Quarter. Class and laboratory work. General prerequisites must include Mechanical Engineering 840 or equivalent. Mr. Marco.

Determination of forces acting in high speed machinery; effects of centrifugal, inertia and vibratory forces; methods of balancing machinery.

842. Advanced Machine Design Problems. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. The work includes conferences, library, drawing board and laboratory work. Mr. Norman, Mr. Marco.

850. Hydro and Aerodynamics. Three credit hours. Autumn Quarter. Three class hours each week. General prerequisites must include Mechanical Engineering 742 or Mechanics 710 or equivalent. Mr. Beitler, Mr. Lindahl.

An advanced study of the dynamics of fluids.

851. Advanced Hydraulic Machinery. Three credit hours. Winter Quarter. Three class hours each week. General prerequisites must include Mechanical Engineering 742 and 850 or equivalent. Mr. Beitler.

An advanced study of the theory of pumps, turbines, and Hydraulic Servo Mechanisms.

852. Advanced Hydraulic Problems. Credit hours to be arranged. Autumn, Winter, and Spring Quarters. The work includes conferences, library, drawing board and laboratory work. Mr. Beitler.

950. Research in Mechanical Engineering. Research work in any of the following fields, under the supervision of the following instructors: automotive engineering and internal combustion engines, Mr. Stinson, Mr. Roberts; heating, ventilating, air conditioning, and refrigerating, Mr. Brown; applied hydraulics, Mr. Beitler; machine design and mechanical vibration, Mr. Norman, Mr. Marco; materials of engineering, Mr. Moffat; steam engineering and fuel testing, Mr. Marquis, Mr. Bucher.

MECHANICS

Office, 205 Industrial Engineering Building

PROFESSORS OTT, FOLK AND POWELL, ASSOCIATE PROFESSORS CLARK, AND TUCKER

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

These prerequisites include acceptable courses in differential and integral calculus and physics.

601. Statistics. Five credit hours. One Quarter. Autumn, Winter, and Spring. Five recitations each week. All instructors.

Resultant and equilbrium of concurrent and non-current coplanar force systems by algebraical and graphical methods; connected bodies; simple trusses; frames involving three-force members; flexible cables; friction; equilibrium of non-current non-coplanar force systems; center of gravity and moment of inertia of masses and plane areas by integral calculus.

602. Strength of Materials. Five credit hours. One Quarter. Autumn, Winter, Spring. Four recitations and one two-hour laboratory period each week. General prerequisites must include a course in statics. All instructors.

Tensile, compressive and shearing stresses and deformations; allowable working stresses; stresses beyond the elastic limit; analysis of axial force on riveted and welded jonits; torsion; bending and longitudinal shearing stresses and deformations in beams; biaxial loading of simple beams; deflection of beams by double integration; column theory and analysis of working column formulas.

605. Strength of Materials. Two credit hours. One Quarter. Autumn and Spring. Two recitations each week. General prerequisites must include Mechanics 602. All instructors.

Combined stress; resilience in bending and torsion; inclined beams; deflection by area moments; statically indeterminate and tapered beams; lateral buckling of beams.

Not open to students who have credit for Mechanics 615.

607. Dynamics. Three credit hours. One Quarter. Autumn, Winter, Spring. Three recitations each week. General prerequisites must include a course in statics. All instructors.

Dynamics of linear and angular motion from constant forces and forces proportional to displacement; connected bodies; impulse and momentum; combined rotation and translation; work, energy, and power.

Not open to students who have credit for Mechanics 617.

610. Mechanics of Fluids. Three credit hours. One Quarter. Autumn, Winter, Spring. Three recitations each week. General prerequisites must include a course in statics. All instructors.

Fluid pressure including stability of simple gravity dams; fundamentals of fluid flow including orifices, weirs, nozzles, venturis, and vortices; pressure of deviated flow; flow friction; non-turbulent flow in pipes, and steady turbulent flow in pipes and uniform open channels; effect of viscosity hydraulic models.

615. Strength of Materials and Elastic Stability. Five credit hours. Spring Quarter. Five recitations each week. General prerequisites must include Mechanics 602. Mr. Folk.

Same content as Mechanics 605 with the addition of: stresses beyond the elastic limit, bending and buckling of thin walled columns and thin plates, collapse of thin walled tubes in torsion, and critical stress as a basis for design.

Not open to students who have credit for Mechanics 605.

617. Dynamics. Five credit hours. Spring Quarter. Five recitations each week. General prerequisites must include Mechanics 602. Mr. Clark.

Same content as Mechanics 607 with the addition of internal stresses in accelerated bodies and structures.

Not open to students who have credit for Mechanics 607.

***650. Aircraft Problems.** Five credit hours. Spring Quarter. Five recitations each week. General prerequisites must include Mechanics 615 and 617 and Aeronautical Engineering 601. Mr. Ott.

Selected topics from the prerequisite courses will be reviewed and given more extended treatment. The use of calculus methods will be emphasized and differential equations introduced.

702. Advanced Strength of Materials. Three credit hours. Autumn Quarter. Three lectures or recitations each week. General prerequisites must include Mechanics 602. Mr. Folk.

Combined stresses; theories of failure of elastic action; design of thick-walled cylinders; stresses in flat plates by approximate methods and by Grashof's formula; curved beams and hooks; torsion in non-circular sections; unsymmetrical sections.

***703. Advanced Strength of Materials Laboratory.** One credit hours. Winter Quarter. One three-hour laboratory period each week. General prerequisites must include Mechanics 602. Mr. Clark.

Laboratory experiments involving the use of electric strain gages, "stress-coat," brittle models, and photoelastic analysis of welded and other structures; determination of fatigue limits.

* Not given in 1946-1947.

707. Advanced Dynamics. Three credit hours. Spring Quarter. Three recitations each week. General prerequisites must include Mechanics 607. Mr. Ott.

Acceleration, velocity and displacement from variable forces. Vibration, free and forced. Percussion and impact. Dynamic balance. Vibration and whipping of shafts. Gyroscopic motion.

710. Advanced Mechanics of Fluids. Three credit hours. Winter Quarter. Three recitations each week. General prerequisites must include Mechanics 610. Mr. Powell.

A continuation of subject matter of Mechanics 610, including plotting of streamlines and pathlines; Von Karman's theory of pipe friction; unsteady flow in pipes; non-uniform flow in open channels; and the elements of dimensional analysis and dynamic similarity as applied to model testing.

799. Special Problems in Advanced Mechanics. Two to five credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include Mechanics 602 and 607, and consent of instructor. All instructors.

This course is intended to give the advanced student an opportunity to pursue special studies not offered in fixed curricula, in such topics as mechanics of earth action, photoelastic analysis, stress analysis by various types of models, balancing and other dynamic problems, advanced theoretical mechanics, and the study of hydraulic models. A student may repeat the course until he has a maximum of fifteen credit hours.

801. Advanced Theoretical Mechanics. Three to eighteen credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include Mathematics 611 and Mechanics 605, 607 and 610 or equivalent in addition to evidence of sufficient background in the area of study chosen. All instructors.

Topics will be selected from the following:

(a) Advanced statics; (b) advanced dynamics; (c) hydrodynamics and fluid mechanics; (d) soil mechanics; (e) strength of materials; and (f) applied elasticity.

***807. Vibrations.** Three credit hours. Spring Quarter. General prerequisites must include Mechanics 605 and 607 and Mathematics 609 or the equivalent. Mr. Ott.

Forced and free vibrations; accelerations and displacements from variable forces; damping; resonance; phase angles; negative damping.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

950. Research in Mechanics. Autumn, Winter, and Spring Quarters.

MEDICAL AND SURGICAL RESEARCH

(See Medicine and Surgical Research)

MEDICINE

Office, Kinsman Hall

PROFESSORS WISEMAN, DOAN, AND STAFF

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 45.

***750. Principles of Hematology.** One credit hour. Autumn Quarter. General prerequisites must include Anatomy 624 or its equivalent and the permission of the instructor must be obtained. Mr. Doan and staff.

A seminar and laboratory course meeting every second Monday afternoon from 2 to 5 during the Autumn Quarter. The normal human and comparative blood pictures including a study of the normal hematogenic organs will be emphasized, but sufficient pathological material

* Not given in 1946-1947.

will be introduced to establish the limits for the range of normal. Each student will be expected to select some special phase of the field and develop it thoroughly with an adequate survey of the current literature, to be organized for presentation before the group at some time during the course. Independent work will be encouraged. Limited to a maximum of twenty-five students.

780. Minor Problems. Three to five credit hours. All Quarters. Library, conference and laboratory work. General prerequisites must include adequate preclinical training and satisfactory scholarship in regular required course work. Permission of the Director of the Department is required.

FOR GRADUATES

900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

950. Medical Research. Autumn, Winter, and Spring Quarters. Library conference, and laboratory work. General prerequisites must include acceptable courses in the basic preclinical sciences, and proof of an interest in and the ability to undertake the selected project. The student may spend a part or all of his time in research work and he must be registered in the Graduate School. Permission of the Director of the Department is required. Mr. Doan and staff.

METALLURGY
Office, 100 Lord Hall

PROFESSORS DEMOREST AND MUELLER, ASSOCIATE PROFESSOR LORD, ASSISTANT PROFESSOR RAUTIO

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

These general prerequisites include fundamental courses in physics and metallurgy.

The following courses do not carry graduate credit for students who received the degree of Bachelor of Metallurgical Engineering from The Ohio State University: 605, 606, 610, 620, 650, 651, 701, 705, 706, 709, 713, 714, 715, 720.

605. Iron and Steel Metallurgy. Three credit hours. Winter Quarter. Three lectures or recitations each week. General prerequisites must include Metallurgy 651. Mr. Demorest.

Lectures and problem work on the production of pig iron, open hearth, bessemer and electric steel and malleable cast iron and the rolling and forging of steel shapes. Calculation of furnace charges and application of thermodynamics to the equilibria approached in metallurgical operations.

606. Principles of Metallography. Three credit hours. One Quarter. Autumn and Spring. Two lectures and four hours of laboratory each week. General prerequisites must include two Quarters of college chemistry. Mr. Lord.

An elementary course in physical metallurgy. Study of structures and equilibrium relations of metals and alloys by use of the microscope. Crystalline structure and physical properties of metals and alloys and changes produced therein by temperature. Problems on the quantitative distribution of structural features. Construction and significance of equilibrium diagrams. In the laboratory, metals and alloys are melted and cast and specimens are prepared for microscopic examination to correlate structure with composition and treatment.

610. Non-ferrous Metallurgy. Five credit hours. Winter Quarter. Five recitations each week. General prerequisites must include one year of college chemistry. Mr. Mueller.

Metallurgy and properties of the common non-ferrous metals. The chemical principles of the reduction of base metals from their ores. Refining and preparation for the market from the standpoint of physical and operative metallurgical principles. The igneous solution of impurities and concentration of precious metals in common base metals from the standpoint of theoretical equilibrium diagrams. The common hydro-metallurgical processes for copper, zinc, gold, and silver, and their possible applications to other metals. General principles of electro-metallurgy of the common metals for igneous and hydro-metallurgical applications. The study of slags and their equilibrium diagrams as related to the reduction of ores, refining of base metals and relation of slags to furnace and ladle linings.

620. Principles of Ore Dressing and Coal Cleaning. Five credit hours. Autumn Quarter. Four lectures or recitations and one three-hour laboratory period each week. General prerequisites must include a course in descriptive mineralogy. Mr. Mueller.

An introduction to the field of mineral dressing. Fundamental principles of mineral and coal preparation for economic uses. Principles and design of crushers and grinders. Wet and dry classifiers and screens. Principles of mineral separations by various processes, such as use of jigs, tables, magnetic and electrostatic separators, trough separators and flotation. Principles and equipment used for settling, thickening and filtration of concentrates, tailings and coal. Flow sheets of plants.

650. Pyrometry. Two credit hours. One Quarter. Autumn and Spring. One lecture or recitation and one three-hour laboratory period each week. Mr. Lord.

Lectures, laboratory, and problem work on the calibration and use of resistance thermo-electric, optical, and total radiation pyrometers.

651. Fuels. Three credit hours. One Quarter. Autumn and Winter. Three lectures or recitations each week. Mr. Demorest, Mr. Mueller.

Origin and manufacture of solid, liquid and gaseous fuels. Chemical compositions and variations of fuels. Carbonization and destructive distillation processes. Gasification processes. Thermochemistry and thermodynamics of combustion and gas reactions with much problem work.

701. Metallography of Iron and Steel. Four credit hours. Spring Quarter. Two lectures or recitations and two three-hour laboratory periods each week. General prerequisites must include Metallurgy 606. Mr. Lord.

Physical metallurgy applied to iron-carbon alloys, steels, and cast iron. Continuation of Metallurgy 606 with specific reference to iron-carbon alloys. Iron and steel terminology and conventional methods of heat treatment are studied from the standpoint of equilibrium and structure changes. Laboratory work in the development of the technique of taking photomicrographs of carbon steels in annealed and heat treated condition.

702. Metallography of Special and Alloy Steels. Three credit hours. Spring Quarter. Two lectures or recitations and one three-hour laboratory period each week. General prerequisites must include Metallurgy 701. Mr. Lord.

A continuation of Metallurgy 701 and introduction into the general subject of alloy steels Lectures on effects of alloying elements other than carbon in steels. Special treatmnts, such as case carburizing and nitriding and the metallographic and structural features and equilibrium relationships involved. Laboratory work in measuring critical and transformation temperatures, practical carburizing, and heat treatment to secure specified structures and physical properties.

705. Metallurgical Construction. Four credit hours. Autumn Quarter. Two lectures or recitations and three two-hour laboratory periods each week. General prerequisites must include Metallurgy 651, 605, 720, 610, or 655. Mr. Mueller.

Principles, practice and design of concentrators and coal-washing plants. Study of flow sheets for milling processes; location of plants and accessory equipment. Relation of plants to climatic and topographic conditions, health hazards and power facilities. Consideration of equipment for various conditions and purposes, labor requirements and housing of same.

706. Metallurgical Construction. Four credit hours. Winter Quarter. Two lectures or recitations and two three-hour laboratory periods each week. General prerequisites must include Metallurgy 705. Mr. Demorest, Mr. Mueller.

Option: continuation of Metallurgy 705 with special reference to operation, control, costs, and handling of materials; or lectures, recitations, and drawing-room practice on the principles, practice, and design of metallurgical furnaces and plants with special reference to refractories and heat transfer.

709. Advanced Fuel Testing and Problems. Four credit hours. Autumn Quarter. Two lectures and two three-hour laboratory periods each week. General prerequisites must include Metallurgy 651. Mr. Demorest, Mr. Mueller.

Problems and advanced laboratory work in fuel and gas testing. Thermodynamics of combustion and fuel production and utilization. Gas distribution and corrosion of pipes.

710. Metallurgical Investigations. Three to five credit hours. Three Quarters. Autumn, Winter, Spring. One recitation or lecture and two or four three-hour laboratory periods each week. General prerequisites must include permission of the department. Mr. Demorest, Mr. Mueller, Mr. Lord.

The class is divided into groups for investigation along the lines of their special interests as follows:

(a) The Properties of Metals and Alloys.
(b) Production and Refining of Metals.
(c) Ore Dressing and Coal Cleaning.
(d) Manufactured Gas and Coal Distillation Processes.
(e) Metallurgical Equilibria.

All investigations are under close direction of instructors.

713. The Production of the Light Metals. Three credit hours. Winter Quarter. Three lectures or recitations each week. General prerequisites must include Metallurgy 605 and 651. Mr. Demorest, Mr. Mueller.

Lectures and problem work on the light metal ores and their preparation and the production and refining of the metals.

714. The Physical Metallurgy of the Light Metals and Non-Ferrous Alloys. Three credit hours. Spring Quarter. Two lectures and one three-hour laboratory period each week. General prerequisite must include Metallurgy 701. Mr. Lord.

The study of the physical properties, the metallography and heat treatment of the light metals and their alloys.

715. The Making and Shaping of Steel. Three credit hours. Winter Quarter. Three lectures each week. General prerequisites must include Metallurgy 605. Mr. Demorest, Mr. Rautio.

Lectures and problems on the making of steel in the Bessemer, Electric and Open Hearth furnaces from the Thermodynamic point of view and the metallurgical aspects of shaping of steel.

720. Advanced Ore Dressing. Three credit hours. Winter Quarter. Two lectures and one three-hour laboratory period each week. General prerequisites must include Metallurgy 620. Mr. Mueller.

Design of flow sheets for ore concentration, coal cleaning and non-metallic mineral separation. The general technique of cyanidation of gold ores and other leaching processes and the refinish of the recovered products.

730. Corrosion of Metals and Alloys. Three credit hours. One Quarter. Winter and Spring. Two lectures and two hours of laboratory each week. Mr. Fontana.

Theory and type of corrosion with a study of the variables involved and of methods of corrosion testing and study. Interpretation and expression of corrosion-resistant alloys.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

950. Research in Metallurgy. Autumn, Winter, and Spring Quarters. Mr. Demorest, Mr. Mueller, Mr. Lord, Mr. Rautio.

MINE ENGINEERING

Office, 219 Lord Hall

PROFESSORS NOLD AND O'ROURKE

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

The following courses do not carry graduate credit for students who received the degree Bachelor of Mine Engineering from The Ohio State University: 601, 602, 603, 702.

601. Prospecting and Preliminary Operations. Three credit hours. Winter Quarter. Three recitations each week. General prerequisites must include a course in geology. Mr. Nold.

Prospecting and boring, their geologic and economic interpretation. Supporting excavations and the materials used.

602. Explosives and Rock Work. Three credit hours. Spring Quarter. Three recitations each week. General prerequisites must include a course in chemistry and general geology.

Explosives, quarrying, tunnelling, shaft sinking, dredging and excavating machinery.

603. Development and Methods of Mining. Three credit hours. Autumn Quarter. Three recitations each week. General prerequisites must include Mine Engineering 602. Mr. Nold.

Development, location of openings, methods of mining.

Not open to students who have credit for Mine Engineering 701.

704. Mine Gases and Ventilation. Three credit hours. Winter Quarter. Three recitations each week. General prerequisites must include Mine Engineering 603 and concurrent Mechanical Engineering 674. Mr. Nold.

Mine Gases, occurrence, detection, chemical and physical properties, physiological effects when breathed. Air flow and control in mines, ventilating fans. Legal requirements for mine ventilation, mine explosions and mine fires. Mine illumination.

Not open to students who have credit for Mine Engineering 702.

705. Mine Operations. Three credit hours. Autumn Quarter. General prerequisites must include Mine Engineering 704, Mechanical Engineering 674, and Electrical Engineering 643.

Drainage, Hauling, Hoisting, Theory, mine practice, solution of problems.

721. Petroleum Engineering. Three credit hours. Autumn Quarter. Three recitations each week. General prerequisites must include a course in geology and a course in physics. Mr. O'Rourke.

Prospecting, drilling, and development of oil and gas fields, oil recovery methods.

722. Petroleum Engineering. Three credit hours. Winter Quarter. Three recitations each week. General prerequisites must include Mine Engineering 721. Mr. O'Rourke.

Power gathering systems, preparation of crude petroleum for market, storage, transportation.

723. Petroleum Engineering. Three credit hours. Winter Quarter. One recitation and two two-hour laboratory periods each week. General prerequisites must include Mine Engineering 721.

Laboratory work in examining and testing petroleum bearing rocks.

750. Mine Investigations. Three to ten credit hours. Autumn, Winter, and Spring Quarters. Conference, library, and laboratory work. In addition to the general prerequisites, the approval of the instructor must be obtained. This course may be repeated until the student has accumulated not to exceed twenty-four credit hours. Mr. Nold, Mr. O'Rourke.

a. Study and Investigation of Some Phases of Mine Development and Operation.
b. Study of Mine Ventilation and Laboratory Work with Ventilating Equipment.
c. Study of the Engineering Problems of Petroleum and Natural Gas Exploration, Production, and Transportation.
d. Design of Mines, Mining Plants, or Planning of Petroleum and Natural Gas Field Development.
e. Mine Examinations and Reports, including estimation of mineral reserves, valuation reports, costs, and administration.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

801. Mine Planning and Design. Five to ten credit hours. Autumn, Winter, and Spring Quarters. Conference, library, and laboratory work. General

prerequisites must include satisfactory courses in Mine Engineering, mineral beneficiation, and geology. Mr. Nold.

The work of the course is carried on by individual conferences, library, and laboratory work. Economic and engineering analysis of a mining property from geologic and prospecting data, mine design, planning of operations, etc.

802. Petroleum Production and Oil Field Development and Operational Problems. Five to ten credit hours. Autumn, Winter and Spring Quarters. Conferences, library, and laboratory work. General prerequisites must include satisfactory courses in Petroleum Engineering and Geology.

The work of the course is carried on by individual conferences, library, and laboratory work. Examination and testing of petroleum bearing rocks; economic interpretation and application to problems of primary and secondary recovery.

950. Research in Mine Engineering. Autumn, Winter, and Spring Quarters. Mr. Nold, Mr. O'Rourke.

Library, conference, laboratory, and field work on some phase of mining or mine operations.

MINERALOGY

Office, 115 Lord Hall

PROFESSOR McCAUGHEY, ASSOCIATE PROFESSOR BRANT

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

These prerequisites include fundamental courses in crystallography and mineralogy.

***601. Advanced Crystallography.** Five credit hours. Autumn Quarter. Mr. Brant.

Study of the thirty-two crystal groups and their representative crystals. Laboratory practice with the two circle goniometer in the measurement of crystals and in the drawing and projection of crystals.

605. Thermochemical Mineralogy. Three credit hours, Autumn Quarter. Four credit hours, Spring Quarter. Three or four lectures each week. General prerequisites must include a course in physical chemistry or its equivalent. Mr. McCaughey.

Thermal properties of minerals. Phase equilibria in mineral systems at high temperatures and the application to problems of refactories, ceramic systems and metallurgical slags.

606. Advanced Thermochemical Mineralogy. Three credit hours. Winter Quarter. Three lectures each week. General prerequisites must include Mineralogy 605. Mr. McCaughey.

Continuation of Mineralogy 605. Formation and solid solution of silicate minerals in multiple component systems.

621. Microscopic Mineralogy. Five credit hours. One Quarter. Autumn and Spring. Two lectures and three two-hour laboratory periods each week. General prerequisites must include a course in descriptive mineralogy and a college course in physics, covering light. Mr. McCaughey, Mr. Brant.

The use of a polarizing microscope in the identification of minerals in fine powder and thin section. Determination of the optical constants of minerals and crystallized substances with the polarizing microscope.

622. Microscopic Petrography. Four credit hours. Winter Quarter. Two lectures and two two-hour laboratory periods each week. General prerequisites must include Mineralogy 621. Mr. McCaughey, Mr. Brant.

Use of the petrographic microscope in the identification of minerals in thin sections of rocks. Microscopic investigation of igneous metamorphic and sedimentary rocks, correlating texture, mineral composition, alteration and geological agencies affecting these.

* Not given in 1946-1947.

631. Mineralogical Investigations. Three to five credit hours. One Quarter. Autumn, Winter, Spring. Library, conference, and advanced laboratory work. General prerequisites must include Mineralogy 621. Mr. McCaughey.

a. **Microscopic Petrography.** Study and investigation of igneous, metamorphic, and sedimentary rocks in thin section.

b. **Soil Mineralogy.** Mineralogical investigation of loose rock, such as soils, sand, and clays.

c. **Applied Microscopic Mineralogy.** Application of the principles of microscopic mineralogy to the determination of melting and transformation temperature of minerals; microscopic study of refractories, ceramic products, and glasses.

d. **X-ray Crystal Analysis.** Practice in the application of X-rays to the study of minerals and crystallized materials. Calculation for and determination of the fine structure of crystals.

*754. X-rays and Crystal Structure. Four credit hours. Winter Quarter. Four lectures and recitations each week. General prerequisites must include calculus and one year of college physics. Given in alternate years. Mr. Blake, Mr. McCaughey, Mr. Harris.

This course is designed for those students in physics, chemistry, and mineralogy who intend to do research work in crystal structures and X-ray analysis.

This course is the same as Chemistry 754 and Physics 754.

Not open to students who have credit for Mineralogy 654, Chemistry 654 or Physics 654.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

950. Research in Mineralogy and Petrography. Autumn, Winter, and Spring Quarters. Library, conference, and laboratory. Mr. McCaughey, Mr. Brant.

MUSIC

Offices, 1, 2, 3, 4 Page Hall

The School of Music is a member of the National Association of Schools of Music.

PROFESSORS WEIGEL, DIERCKS, LEEDER AND M. E. WILSON, ASSOCIATE PROFESSORS DIERKER, GILLILAND, HARDESTY, KOB, McBRIDE, SLAWSON AND THOMAS, ASSISTANT PROFESSORS GRAY, HARDY, JONES, KUEHEFUHS, MOONEY, TETLEY-KARDOS, VAN LOON, WHITCOMB, AND H. S. WILSON

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

GENERAL REQUIREMENTS FOR THE MASTER OF ARTS DEGREE

Requirements for Admission to Graduate Work in Music

1. One hundred hours of acceptable academic work, including English, Science, History, Psychology, etc.
   (a) Students majoring in Music Education should also have courses in the theory of education and adequate preparation in the field of Music Education.
   (b) Students majoring in the History of Music should also have a reading knowledge of either French or German sufficient for purposes of research.
2. Seventy hours of the theory of music, including a satisfactory amount of sight-singing and ear-training, harmony, analysis and form, history of music, conducting and instrumentation.
3. Thirty hours of applied music.

COURSE REQUIREMENTS

Research and study in the following special fields of specialization are suggested:

1. Music Education (Vocal)
   (a) Music—15 hours from the following group, recommended according to the interest and preparation of the student: (712)—3 hours; (713)—3 hours; (747)—3 hours; (624)—5

* Not given in 1946-1947.

hours; (623)—5 hours; (646)—3 hours; (748)—3 to 6 hours; (643)—3 hours; (749)—3 to 6 hours; (601)—3 hours; 603)—3 hours; (605)—3 hours; (606)—3 hours; (607)—3 hours; (604)—3 hours.

(b) Minor Problems (650)—5 hours

(c) Research in Music (950)—10 hours

(d) Electives in other fields—15 hours

2. Music Education (Instrumental)

(a) Music—15 hours from the following group; recommended according to the interest and preparation of the student: (749)—3 hours; (640)—3 hours; (641)—3 hours; (642)—3 hours; (643)—3 hours; (631)—3 hours; (632)—3 hours; (601)—3 hours; (603)—3 hours; (605)—3 hours; (606)—3 hours; (607)—3 hours; (604)—3 hours.

(b) Minor Problems (650)—5 hours

(c) Research in Music (950)—10 hours

(d) Electives in other fields—15 hours

3. Music Education (Voice)

(a) Music—15 hours from the following group, recommended according to the interest and preparation of the student: (748)—1 to 5 hours; (716)—3 hours; (646)—3 hours; (624)—5 hours; (601)—3 hours; (603)—3 hours; (605)—3 hours; (606)—3 hours; (607)—3 hours; (602)—3 hours.

(b) Minor Problems (650)—5 hours

(c) Research in Music (950)—10 hours

(d) Electives in other fields—15 hours

4. Music Education (Theory)

(a) Music—15 hours from the following group, recommended according to the interest and preparation of the student: (762)—3 hours; (763)—3 hours; (665)—3 hours; (667)—3 hours; (666)—3 hours; (631)—3 hours; (632)—3 hours; (643)—3 hours.

(b) Minor Problems (650)—5 hours

(c) Research in Music (950)—10 hours

(d) Electives in other fields—15 hours

5. History and Literature of Music

(a) Music—15 hours from the following group, recommended according to the interest and preparation of the student: (601)—3 hours; (603)—3 hours; (605)—3 hours; (606)—3 hours; (607)—3 hours; (604)—3 hours; (608)—3 hours; (610)—3 hours.

(b) Minor Problems (650)—5 hours

(c) Research in Music (950)—10 hours

(d) Electives in other fields—15 hours

6. Psychology of Music

(a) Music—9 hours as follows: (603)—3 hours; (607)—3 hours; (656)—3 hours.

(b) Psychology (667)—3 hours.

(c) Music—Minor Problems (650)—5 hours.

(d) Research in Music (950)—10 hours

(e) Electives in Other Fields—18 hours.

7. Physics of Music.

(a) Physics—15 hours as follows: Modern Physics (640)—3 hours; Acoustics for Students of Music (645)—3 hours; Advanced Physical Laboratory (616)—3 or 6 hours; Minor Problems in Physics (630)—3 or 6 hours.

(b) Music—15 hours from the following group, recommended according to the interest and preparation of the student: (601)—3 hours; (603)—3 hours; (604)—3 hours; (605)—3 hours; (606)—3 hours; (607)—3 hours; Psychology of Music (667)—3 hours; (631)—3 hours; (632)—3 hours; (630)—3 hours; (640)—3 hours; (641)—3 hours; (642)—3 hours; (643)—3 hours; (623)—3 hours; (624)—3 hours; (712)—3 hours; (713)—3 hours; (656)—3 hours; (661)—3 hours; (665)—3 hours; (667)—3 hours; (762)—3 hours; (763)—3 hours.

(c) Research in Music (950)—10 hours

(d) Electives in Other Fields—5 hours.

601. The Romanticists. Three credit hours. Winter Quarter. Three lectures each week. General prerequisites must include fifteen hours of theoretical music or equivalent and a course in history and appreciation. Mr. M. E. Wilson.

The music of the romantic period in Germany and France.

*602. **The Opera of the Nineteenth Century.** Three credit hours. Three lectures each week. General prerequisites must include fifteen hours of theoretical music or equivalent and a course in history and appreciation. Mr. M. E. Wilson.

A short review of the history of opera; a study of the complete more important operas of the Nineteenth Century with the chief emphasis on the Wagnerian music dramas; and a consideration of the problems involved in a hybrid art.

603. **Modern Music.** Three credit hours. Autumn Quarter. Three lectures each week. General prerequisites must include fifteen hours of theoretical music or equivalent and a course in history and appreciation. Mr. M. E. Wilson.

A brief survey of modern developments with special reference to the composers of France and Russia.

*604. **Organ Literature.** Three credit hours. Three lectures each week. General prerequisites must include fifteen hours of theoretical music or equivalent and a course in history and appreciation.

A comprehensive survey from the earliest compositions to the works of present-day composers.

605. **Choral Literature.** Three credit hours. Autumn Quarter. Three lectures each week. General prerequisites must include fifteen hours of theoretical music or equivalent and a course in history and appreciation. Mr. M. E. Wilson.

Choral composers and literature with special consideration of the sixteenth and seventeenth centuries.

*606. **The Literature of Chamber Music.** Three credit hours. Three lectures each week. General prerequisites must include fifteen hours of theoretical music or equivalent and a course in history and appreciation. Mr. M. E. Wilson.

A survey of the chamber music of the classical and romantic periods with performance, analysis, and discussion.

†607. **The Classic Period.** Three credit hours. Winter Quarter. Three lectures each week. General prerequisites must include fifteen hours of theoretical music or equivalent and a course in history and appreciation. Mr. M. E. Wilson.

A study of organ and other keyboard compositions and of chamber music and early orchestra writing in Germany, Italy, France, and England in the period 1650 to 1725

608. **Music Literature of Latin America.** Three credit hours. Spring Quarter. Three lectures and two laboratory periods each week. General prerequisites must include fifteen hours of theoretical music or equivalent and a course in history and appreciation. Miss Dierker.

This course is a survey of the origins, influences and the development of music of the Western Hemisphere. Lectures and assigned readings, supplemented by musical illustrations and phonograph records.

623. **Music Literature for the Elementary School.** Five credit hours. Winter Quarter. Five recitations each week. Miss Dierker.

Designed to familiarize the student with song and listening material suitable for use in the elementary school. Study of material supplementary to that used in Music 523.

624. **Music Education in the Secondary Schools.** Five credit hours. One Quarter. Autumn and Spring. Five recitations each week. Mr. Leeder.

Music literature for use in the secondary schools and how to present it. A course for special teachers and supervisors of music.

630. **Instrumentation.** Three credit hours. Autumn Quarter. Three recitations each week. Mr. Whitcomb.

The study of the instruments of the orchestra and band together with the practical study of their use in small ensembles and beginning instrumental organizations. A number of observations of elementary school organizations and some analysis of existing material for these organizations will be required.

* Not given in 1946-1947.

† Not given during the academic year, 1946-1947.

631. Orchestration I. Three credit hours. Winter Quarter. Three recitations each week. Mr. Whitcomb.

Scoring for string orchestra, salon orchestra and full symphony orchestra including an analysis of the scores of Mozart, Beethoven, Wagner, Berlioz, Rimsky-Korsakov and Ravel. Attendance at a number of rehearsals and concerts of symphony orchestras will be required.

632. Orchestration II. Three credit hours. Spring Quarter. Three recitations each week. General prerequisites must include Music 631 or equivalent. Mr. Whitcomb.

Scoring for woodwind and brass instruments in various combinations and for wind band including an analysis of the scores and arrangements of Stravinsky, Winterbottom, Godfrey, Leidzen, Cailliet and Gould. Attendance at a number of rehearsals and concerts of symphonic bands will be required.

640. Instrumental Music Education. Three credit hours. Autumn Quarter. Three recitations each week. Mr. McBride.

This course provides an opportunity for a critical evaluation of current principles and procedures in the teaching of instrumental music in the elementary schools. Special consideration will be given to instrumental music in the elementary school and will include the study of methods of instructions, organization of materials, teaching procedures and preparatory instruments. Observation in the elementary schools.

641. Instrumental Music Education II. Three credit hours. Winter Quarter. Three recitations each week. Mr. Weigel.

Organization and administration of instrumental music as its functions in the secondary school. Special consideration will be given to the school orchestra, concert band, marching band, small ensembles, solo performance, instrumentation, seating plans, materials, equipment, housing, rehearsal procedures, teaching problems, teacher supervision and teacher training program, repertoire and public performance. Observation in the secondary schools.

642. Instrumental Conducting. Three credit hours. Spring Quarter. Three recitations each week. Mr. Weigel.

The basic technique of the baton with special reference to conducting instrumental organizations. Music suitable for junior and senior high school will be studied. A syllabus of selected literature and reading assignments will be used as a basis of study.

643. Advanced Instrumental Conducting. Three credit hours. Autumn Quarter. Three lectures and drill periods each week. General prerequisites must include Music 642 or equivalent. Mr. Weigel.

This course aims to develop the power to interpret the larger forms of instrumental literature and to read from full score; it includes problems of tempo, phrasing, nuance, balance, dynamics, and timbre.

Open only to students demonstrating advanced capacities in musicianship and technical skills in conducting.

646. Advanced Vocal Conducting. Three credit hours. Winter Quarter. Three recitations each week. Mr. Gilliland.

This course aims to develop the power to interpret the larger forms of choral literature and to read from full score; it includes problems of tempo, phrasing, nuance, balance, dynamics, and timbre.

Open only to students demonstrating advanced capacities in musicianship and technical skills in conducting.

650. Minor Problems. One to five credit hours. All Quarters. In addition to the general prerequisites, the permission of the School must be obtained. All instructors.

Investigation of minor problems in the field of music.

651. Radio Music Programming. Three credit hours. Winter Quarter. Three recitations and one laboratory period each week. General prerequisites must include at least forty-five Quarter hours of music courses including a radio survey course and permission of the instructor.

The analysis and study of music with special reference to mood aspects as they relate to radio music programming.

Students are limited to a total of nine credit hours for Music 555, 651, and 652.

652. **Radio Music Production.** Three credit hours. Spring Quarter. Three recitations and one laboratory period each week. General prerequisites must include at least forty-five Quarter hours of music courses including a radio survey course and permission of the instructor.

Study of the problems in adapting music and its presentation to the radio for commercial and educational purposes. Practice afforded in organizing and mounting music programs.

Students are limited to a total of nine credit hours for Music 555, 651, and 652.

656. **Principles of Music Learning.** Three credit hours. Autumn Quarter. Three recitations each week. Mr. M. E. Wilson.

An analysis of the factors in learning to appreciate and perform music in early childhood and through adult life.

661. **Form and Analysis.** Three credit hours. Autumn Quarter. Three recitations each week. Miss Kuehefuhs, Mr. Kob.

A study of the design and harmonic structure of simple and complex forms of music composition. Standard works analyzed.

*665. **Advanced Harmonic Analysis.** Three credit hours. Spring Quarter. Three recitations each week. General prerequisites must include Music 661.

Study of modern harmonic idioms and forms.

*666. **Teaching of Theory in Secondary Schools.** Three credit hours. Autumn Quarter. Open to graduate students and undergraduates who have had a course in advanced harmony and Music 624. Mr. Kob.

Basic principles and problems in the teaching of music theory. The presentation of a correlated course in sight singing, dictation, and harmony in secondary schools.

667. **Advanced Keyboard Harmony.** Three credit hours. Winter Quarter. Three recitations each week.

Chromatic harmony, modulation through common chord to remote keys; modulation through diminished-seventh and chromatic chords; common tone modulation; non-chordal tones, harmonization at sight of melodies, invention of melodies over a given accompaniment, transposition and improvisation.

671. **Technics and Materials for Church Choirs.** Three credit hours. Winter Quarter. Three recitations each week. General prerequisites must include at least forty-five Quarter hours of music courses. Mr. Diercks.

A study of methods and materials for church choirs including the Boychoir. The study of practical problems of mounting a church service, chanting, processional, etc., with consideration for anthem selection and performance, with observation of choirs.

Not open to students who have credit for Music 772.

712. **Supervision of Music in the Elementary Schools.** Three credit hours. Spring Quarter. Three recitations each week. Spring Quarter. Open to graduate students majoring in music. Mr. Leeder.

A study of the specific problems of music supervision with special attention given to curriculum construction.

Not open to students who have credit for Music 612.

†713. **Supervision of Music in Secondary Schools.** Three credit hours. Open to graduate students majoring in music. Mr. Leeder.

This course is designed to study evaluation criteria and the problems of the music supervisor in the secondary and junior high school.

Not open to students who have credit for Music 613.

*715. **Principles of Group Instruction in Piano.** Three credit hours. Permission of School is required. Miss Jones.

Examination and evaluation of current methods of instruction and materials. This course is designed to provide observation and practice of class instruction in piano for teachers of experience.

Not open to students who have credit for Music 444 or 615.

* Not given in 1946-1947.

† Not given during the academic year, 1946-1947.

716. Principles of Group Instruction in Voice. Three credit hours. Spring Quarter. Five recitations each week. Permission of the School is required. Mr. Gilliland.

Basic principles and problems in group voice instruction with emphasis on the participation approach.

747. Problems in Music Education. One to five credit hours. All Quarters. This course may be repeated to a maximum credit of ten hours. Mr. Leeder.

Study of the problems encountered in the teaching and supervising of music. Additional investigation of the course of study, special programs, the integrated course, etc.

Not open to students who have credit for Music 647.

748. Choral Problems. One to five credit hours. All Quarters. Lectures, observations, and special problems. This course may be repeated to a maximum credit of ten hours. General prerequisites must include permission of the instructor. Mr. Diercks.

Study of the technique of handling choruses of high school age and above, including the study of tone, interpretation and literature. A full chorus will be available for daily observation and demonstrations.

Special emphasis will be placed upon the clinical aspects of the performances and rehearsals.

Not open to students who have credit for Music 648.

749. Instrumental Problems. One to five credit hours. All Quarters. Lectures, observations and special problems. This course may be repeated to a maximum credit of ten hours. General prerequisites must include permission of the instructor. Mr. Weigel.

Problems and procedures in instrumental organizations. A full orchestra or band will be available for daily observation and demonstrations.

Special emphasis will be placed upon the clinical aspects of the performances and rehearsals.

Not open to students who have credit for Music 644.

762. Counterpoint. Three credit hours. Winter Quarter. Three recitations each week. Mr. Kob.

Strict counterpoint in two and three parts.

Not open to students who have credit for Music 662.

763. Counterpoint. Three credit hours. Spring Quarter. Three recitations each week. General prerequisites must include Music 662 or 762. Mr. Kob.

Free counterpoint.

Composition of two-part canon and two- and three-part inventions in the style of Bach.

Not open to students who have credit for Music 663.

†772. The Church Choir. Three credit hours. Five recitations each week. General prerequisites must include at least forty-five Quarter hours of music or equivalent. Mr. Diercks.

A study of the functioning of the church choir as an educational and religious organism, with emphasis on problems of development and direction and upon music as worship and its place in the church program.

Not open to students who have credit for Music 671.

NOTE: For course in Acoustics for Students of Music, see the Department of Physics, Course 645.

For course in the Psychology of Music, see the Department of Psychology, Course 667.

† Not given during the academic year, 1946-1947.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION." page 46.

850. Seminar in Music. One to five credit hours maximum allowed. All Quarters. General prerequisites must include graduate standing and consent of adviser in respective field of specialization.

Extensive reading and research in the field of specialization. Weekly book reviews and outlines. The work of this course is preparatory to a thesis.

950. Research in Music. All Quarters.

Original investigation in the field of specialization culminating in thesis for the Master of Arts degree in Music. Research is possible in the following fields: Instrumental Aspects of Music Education and Instrumental Conducting, Mr. Weigel; Vocal Aspects of Music Education and Evaluation, Mr. Leeder; Theoretical Aspects (Harmony) of Music Education, Mr. Kob; Voice, and Choral Literature, Mr. Diercks; Voice, and Vocal Conducting, Mr. Gilliland; History and Literature of Music, and Psychology of Music, Mr. M. E. Wilson; Acoustics for Students of Music, Mr. Shaffer.

NOTE: For course in the Preparation of Theses, see the Department of Education, Course 802.

NEUROLOGY AND PSYCHIATRY

Office, Hamilton Hall

PROFESSORS PALMER, BATEMAN, HARDING, AND LeFEVER, ASSOCIATE PROFESSORS TALLMAN AND WAGENHALS, ASSISTANT PROFESSORS EVANS, MICHAEL AND SECREST, MR. CLARK, MR. ANDERSON, MR. HUMPHREYS, MR. LaGUARDIA AND MR. ALPERS

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

780. Minor Problems. Three to five credit hours. All Quarters. Library, conference, and laboratory work. Prerequisite, adequate pre-clinical training and satisfactory scholarship in regular required course work. Permission of the Chairman of the Department is required.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

830. Psychiatry for the Social Worker. Three credit hours. Winter Quarter. Prerequisite, ten hours of social administration including Social Administration 827 and preferably 825. Mr. Laguardia.

A consideration of the neuroses and psychoses (organic and functional) as currently classified in psychiatric practice. Emphasis on physical, emotional, and social factors which contribute to the various mental illnesses. Survey description of treatment measures with special attention to ways in which the social workers may facilitate the efforts of the psychiatrist.

950. Neuropsychiatric Research. All Quarters. Library, conference, and laboratory work. Prerequisite, acceptable courses in the basic preclinical sciences, and proof of an interest in and the ability to undertake the selected project. The student may spend a part or all of his time in research work and he must be registered in the Graduate School. Mr. Palmer and staff.

NURSING

PUBLIC HEALTH NURSING

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," see page 46.

602. Public Health Nursing and Health Service in the Family. Five credit hours. One Quarter. Autumn and Spring. Five class meetings each week. Miss Leazenbee.

A study of the history and development of Public Health Nursing together with a critical evaluation of the aims, objectives, and underlying principles involved.

OBSTETRICS AND GYNECOLOGY

Office, University Hospital

PROFESSORS REEL AND FLETCHER, ASSOCIATE PROFESSORS BARNES, COX, AND PAVEY, ASSISTANT PROFESSORS F. W. DAVIS, STEDEM, HOLLENBECK AND HUGENBERGER, MR. DALY

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

780. Minor Problems. Two to five credit hours. All Quarters. Prerequisite, adequate preclinical training and permission of instructor required. Mr. Reel, Mr. Barnes, and Mr. Hollenbeck.

Clinical, laboratory, conference, and library work in Obstetrics and/or Gynecology.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

900. Obstetrical and Gynecological Pathology. Two to five credit hours. All Quarters. Permission of instructor required. The staff.

Laboratory, conference, and library work. Study of current pathological specimens with emphasis upon special investigation.

950. Obstetrical and Gynecological Research. All Quarters. Prerequisite, adequate preclinical training and permission of instructor required. The student is required to spend part of his time in research work and must be registered in The Graduate School. The staff.

Clinical, laboratory, conference, and library work in Obstetrics and/or Gynecology.

PATHOLOGY

Office, 310 Hamilton Hall

PROFESSORS von HAAM, AND REINHART, ASSISTANT PROFESSORS DAVIDSON AND HARTWELL, MR. FIDLER, MR. MILLISER, MR. CHESNER, MR. SPYKER

Prerequisites for Graduate Work: Graduate work in *pathologic anatomy* is offered to students who are in possession of an M.D. degree or students in the College of Medicine of The Ohio State University. Students desiring to register during the Summer Quarter must have been registered previously in the College of Medicine of The Ohio State University or some other first grade school of medicine. The prerequisites for major graduate work in pathologic anatomy for students not in possession of an M.D. degree include the successful completion of the freshman schedule of the College of Medicine or its equivalent and passing of Pathology 624 (Principles of Pathology) or its equivalent with not less than B standing.

For students majoring in some other science and desiring courses in *pathologic anatomy*, permission must be obtained in every specific case from the chairman of the department.

For both the Master's degree and the Ph.D. degree in *pathologic anatomy* a thorough training in autopsy technic and surgical pathology is required in addition to the successful completion of course work and the required thesis or dissertation. Such training is obtained in one of the hospital laboratories affiliated with the Department of Pathology.

Graduate work in *clinical pathology* is offered to students who are in possession of a B.A. or B.S. degree from any recognized college of the United States. The prerequisites for major graduate work in clinical pathology are a major in chemistry or bacteriology and courses meeting the requirements for admission to the College of Medicine.

In order to obtain a Master's or Ph.D. degree in clinical pathology a thorough practical training in all laboratory work as performed in the various hospital laboratories is required. In addition to the regular course work and required thesis or dissertation the candidate must spend one year in the laboratory of a hospital affiliated with the Department of Pathology and must be able to qualify for certification by the Board of Medical Technologists.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

Courses 603-626 inclusive are open only to students who are doubly registered in the College of Medicine and the Graduate School, to the extent of fifteen Quarter hours.

603. Clinical Pathology. Three credit hours. Winter Quarter. Two lectures and four laboratory hours each week. General prerequisites must include Bacteriology 641-642 and Physiological Chemistry 601-602. Mr. Reinhart and staff.

A study of unstained and stained blood specimens; special blood pathology; blood typing and matching. Animal parasites and ova. Examination of feces. Special parasites of blood and tissues.

604. Clinical Pathology. Three credit hours. Spring Quarter. Two lecture and four laboratory hours each week. General prerequisites must include Bacteriology 641-642 and Physiological Chemistry 601-602. Mr. Reinhart and staff.

Urinalysis. Blood chemistry and functional tests. Study of sputum, spinal fluid, gastric contents, blood cultures and sero-diagnostic methods.

616-617-618. Research in Clinical Pathology. Three credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include Pathology 603-604. Mr. Reinhart and staff.

Study of new methods and tests on materials collected in the hospital wards and out-patient department.

624. General Pathology. Five credit hours. Autumn Quarter. Three lecture and six laboratory hours each week. Mr. von Haam and staff.

Detailed study of degenerative, circulatory, and inflammatory lesions. Tumor pathology.

625. Special Pathology. Five credit hours. Winter Quarter. Three lecture and six laboratory hours each week. General prerequisites must include Pathology 624. Mr. von Haam and staff.

Pathology of the circulatory, respiratory, and gastro-intestinal systems.

626. Special Pathology. Five credit hours. Spring Quarter. Three lecture and six laboratory hours each week. General prerequisites must include Pathology 625. Mr. Davidson and staff.

Pathology of the genito-urinary, reproductive, endocrine, reticulo-endothelial, nervous, and skeletal systems.

653-654. Clinical Pathology. Three credit hours. 653, Winter Quarter; 654, Spring Quarter. One lecture and four laboratory hours each week. General prerequisites must include acceptable courses in bacteriology and chemistry. Mr. Reinhart and staff.

A study of the changes in the blood, secretions, serums, and exudates of the body brought about by disease.

661. General Pathology. Five credit hours. Autumn Quarter. Three lecture and six laboratory hours each week. Mr. von Haam and staff.

Detailed study of degenerative, circulatory, and inflammatory lesions. Tumor pathology.

662. Special Pathology. Five credit hours. Winter Quarter. Three lecture and six laboratory hours each week. General prerequisites must include Pathology 661. Mr. von Haam and staff.

Pathology of the circulatory, respiratory, and gastro-intestinal systems.

663. Special Pathology. Five credit hours. Spring Quarter. Three lecture and six laboratory hours each week. General prerequisites must include Pathology 662. Mr. Davidson and staff.

Pathology of the genito-urinary, reproductive, endocrine, reticulo-endothelial, nervous, and skeletal systems.

725. Surgical Pathology. One credit hour. Autumn Quarter. One lecture each week. Mr. Chesner.

A course correlating clinical symptomatology with the pathology of specimens removed by major chest and abdominal surgery.

726. Medical Pathology. One credit hour. Winter Quarter. One lecture each week. Mr. Hartwell.

A course correlating the symptomatology of internal diseases with organ pathology.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

950. Research in Pathology. Autumn, Winter, Spring, and Summer Quarters. General prerequisites must include accepted courses in basic preclinical sciences. Mr. von Haam and staff.

PHARMACY

Office, 104 Pharmacy and Bacteriology Building

PROFESSORS CHRISTENSEN, HINER, GUTH, AND HARRIS, ASSOCIATE PROFESSOR BROWN, ASSISTANT PROFESSOR WILLIAMS, MR. ORR

Prerequisites for Graduate Work: The student must have graduated with high standing from an accredited college of pharmacy whose entrance and graduation requirements are equivalent to those in effect for the College of Pharmacy of The Ohio State University.

Requirements for the Degree Master of Science in Pharmacy:

(a) *Course of Study.* Not later than the first Quarter of residence the candidate shall submit to the Graduate Committee in Pharmacy his program of study. It must show the subject of the proposed thesis, and the courses to be undertaken in the field of specialization and in related fields.

(b) *Residence Requirement.* At least six Quarters of full-time graduate study will be necessary to meet the requirements for this degree. The student must be registered in the Graduate School during his entire period of residence for the degree.

(c) *Thesis.* A thesis embodying the results of independent investigations and of sufficient importance to justify publication in a technical journal is required. It is expected that about one-third of the time of the student should be devoted to research.

(d) *Examinations.* Examinations either oral or written or both covering the field of specialization, allied fields, and the thesis are conducted by an examining committee as a concluding basis for determining whether or not the candidate is recommended for the degree.

Requirements for the Degree Doctor of Philosophy:

(a) *Advisory Committee.* Graduate programs for this degree are under the general supervision of an advisory committee consisting of members of the staff of the College of Pharmacy and representatives from cognate departments.

(b) *Course of Study.* Not later than the fourth Quarter of residence the candidate shall submit to the advisory committee in Pharmacy his program of study. It must show the subject of the proposed dissertation, and the courses to be taken in the field of specialization and in two cognate fields.

(c) *Field of Specialization.* The special field of study may be elected from any of the four subdivisions of Pharmacy, namely, Pharmaceutical Chemistry, Pharmacognosy, Pharmacology, or Pharmacy.

(d) *Examinations.* The general examinations for admission to candidacy for the degree are conducted by a committee appointed by the Dean of the Graduate School, upon written request of the student's adviser (who acts as chairman). This committee must include at least one representative from each of the departments in which the student is taking his cognate studies. When the student's adviser decides that the student is ready for the general examinations he will so notify the office of the Graduate School in writing. The general examinations shall be both written and oral.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

601. Glandular Products. Three credit hours. One Quarter. Autumn and Winter. Three lectures and recitations each week. Mr. Hiner.

Preparation, properties, standardization and uses of medicinal products obtained from organs and glands of animals.

602. Biological Products. Two credit hours. One Quarter. Autumn and Spring. Two lectures and recitations each week. Mr. Hiner and assistant.

U.S.P. standards and legal requirements governing manufacture, standardization, storage, and distribution of toxins, antitoxins, serums and vaccines.

608-609. Materia Medica. Five credit hours each Quarter. 608, Winter; 609, Spring. Four lectures and one three-hour laboratory period each week. Mr. Christensen, Mr. Hiner.

Lecture, recitation and laboratory courses covering the fundamental facts in materia medica and including a discussion of the more commonly used drugs and preparations with a brief discussion of their pharmacology and therapeutic applications.

611. Pharmaceutical Analysis. Five credit hours. Winter Quarter. Two lectures, one recitation, and two three-hour laboratory periods each week. Mr. Harris.

A course in pharmaceutical chemistry dealing especially with fixed oils, fats, waxes, soaps, resins, volatile oils, etc., and the application of the polariscope, refractometer, etc., in the examination of commercial products.

612. Pharmaceutical Analysis. Five credit hours. Spring Quarter. Two lectures, one recitation, and two three-hour laboratory periods each week. Mr. Harris.

The work of this Quarter deals largely with the pharmacopoeial assays and a general examination of various drug products.

617. Microscopical Pharmacognosy. Three credit hours. One Quarter. Autumn and Winter. One lecture and recitation and two two-hour laboratory periods each week. Mr. Hiner and assistant.

A microscopical study of crude drugs, spices, food products, etc., and their adulterants.

618. Microscopical Pharmacognosy. Three credit hours. One Quarter. Autumn and Spring. One lecture and recitation and two two-hour laboratory periods each week. Mr. Hiner.

The application of microchemical tests in the identification of cell inclusions and plant constituents such as organic acids, organic salts and alkaloids.

700. Minor Problems. One to five credit hours each Quarter. Autumn, Winter, and Spring Quarters. Staff.

Conference, library, and laboratory work.

A student may obtain a maximum of fifteen credit hours in the course.

701. Minor Problems. One to five credit hours each Quarter. Autumn, Winter, and Spring Quarters. Staff.

Conference, library, and laboratory work.

A student may obtain a maximum of fifteen credit hours in the course.

710. Technology. Three to six credit hours each Quarter. Autumn and Spring. Conference, library, and laboratory work.

The student may obtain a maximum of eighteen credit hours in any one of the following special fields, but not more than twenty-four hours in the course.

(a) Problems in the manufacture of pharmaceutical preparations. Mr. Guth.

(b) Technological theories and principles with industrial applications. Mr. Guth.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

810. Problems on Drug Standardization. Three to six credit hours each Quarter. Winter Quarter. General prerequisites and permission of the instructor. Conference, library, and laboratory work.

The student may obtain a maximum of eighteen credit hours in any one of the following special fields, but not more than twenty-four hours in the course.

(a) Biological methods. Mr. Christensen.

(b) Chemical methods. Mr. Christensen.

816. Special Problems in Pharmacognosy. Three to six credit hours each Quarter. Autumn Quarter. General prerequisites and permission of the instructor. Conference, library, laboratory, and field work.

The student may obtain a maximum of eighteen credit hours in any one of the following special fields, but not more than twenty-four hours in the course.

(a) Macro and micro-analysis of medicinal plants. Mr. Hiner.

(b) Chemical methods. Mr. Orr, Mr. Guth.

820. Special Problems in Pharmaceutical Chemistry. Three to six credit hour each Quarter. Spring Quarter. General prerequisites and permission of the instructor. Conference, library, and laboratory work.

The student may obtain a maximum of eighteen credit hours in any one of the following special fields, but not more than twenty-four hours in the course.

(a) Synthetic organic medicinals. Mr. Orr, Mr. Harris.

(b) Chemistry of plant drug constituents. Mr. Orr, Mr. Harris.

(c) Advanced drug analysis. Mr. Orr, Mr. Harris.

850. Seminar. One to four credit hours. Autumn, Winter, and Spring Quarters. Mr. Christensen, Mr. Guth, Mr. Hiner, Mr. Harris.

Round table discussions, oral and written reports dealing with recent advances in pharmacy.

950. Research. Autumn, Winter, and Spring Quarters. Mr. Christensen, Mr. Guth, Mr. Hiner, Mr. Harris.

PHILOSOPHY

Office, 320 University Hall

PROFESSORS AVEY, LEIGHTON (EMERITUS), CHANDLER, AND EVANS, ASSISTANT PROFESSORS REITHER AND LOWE, MR. WATERS

Prospective students are strongly recommended to prepare for graduate work in this department by taking related courses in other departments. Psychology is regarded as related to all courses in philosophy. The following are suggested as related courses in other departments. For students of logic and metaphysics: mathematics, and natural sciences, especially general and theoretical physics, general and historical chemistry, and evolution (Zoology 509); for students of ethics and the philosophy of religion: sociology, politics, and history; for students of the history of philosophy: European history, and the history of Greek, German, English, and French literatures. Students proposing to specialize in philosophy must previously have completed the equivalent of at least eighteen Quarter-credit hours in philosophy and psychology. In case of students whose main interest is in ethics, two Quarters' work in the principles of sociology may be accepted in partial fulfillment of the above requirement.

Candidates for the Ph.D. degree in Philosophy are required to present themselves for general examinations in the elements of the entire subject, and also for more intensive examinations on six of the following subdivisions:

1. Greek philosophy through Aristotle
2. Graeco-Roman philosophy from the death of Aristotle to Plotinus

3. Modern philosophy through Kant
4. Modern philosophy from Kant to the present (including Kant)
5. Ethics
6. Social and political philosophy
7. Methodology of the sciences
8. Symbolic logic
9. Theory of knowledge
10. Metaphysics
11. Aesthetics
12. History and philosophy of religion

The candidate's choice of topics shall be made in consultation with the department and shall be relevant to the topic of his thesis.

Philosophy 661, 662, or their equivalent, are required of all candidates for the Doctor's degree.

Students who hope to obtain the Master's degree in three Quarters should be well grounded in logic and in the history of philosophy. The program for the degree will normally include twenty-five to thirty-five hours constituting the major in philosophy, with the remainder of the required forty-five hours in an appropriate minor subject. The major work should round out the student's knowledge of the history of philosophy, acquaint him with some of the special fields of philosophy, and train him in independent work in the preparation of the required thesis.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION" page 46.

Courses bearing numbers 601 to 650 are historical; courses bearing numbers 651 to 700 are systematic.

601. Ancient Philosophy. Five credit hours. Autumn Quarter. Mr. Lowe.

The development of philosophical thought from the Greeks through the Middle Ages. Most of the time is devoted to Greek Philosophy. A natural continuation of this course will be found in Philosophy 602.

602. Modern Philosophy to Hegel. Five credit hours. Winter Quarter. Mr. Reither.

The development of philosophical thought from the Renaissance to the Nineteenth Century. A natural continuation of this course will be found in Philosophy 603.

603. Philosophy since Hegel. Five credit hours. Spring Quarter. General prerequisites must include Philosophy 602. Mr. Lowe.

The development of philosophical thought from the early Nineteenth Century to the present. Special attention is given to the relations between philosophy, scientific development, social movements, and literature.

***604. Recent and Contemporary Philosophy.** Three credit hours. Autumn Quarter. General prerequisites must include either Philosophy 601, 602, 603, or 656.

Philosophical movements of the day and their relation to current social problems.

623. Representative Greek Philosophers. Five credit hours. Winter Quarter. General prerequisites must include Philosophy 601. Mr. Waters.

A study of selected works of Aristotle.

***625. Representative Modern Philosophers.** Three credit hours. Winter Quarter. General prerequisites must include Philosophy 602. Mr. Reither.

A few representative works of classic thinkers of the period from Bacon and Descartes to Schopenhauer will be selected for intensive study.

628. The Platonic Tradition in European Thought. Five credit hours. Autumn Quarter. Mr. Avey.

A study of certain dialogues of Plato and of their influence upon aspects of Neo-Platonism, Christianity, the Florentine Academy, the Cambridge Platonists, the English poets.

***649. Symbolic Logic.** Four credit hours. Spring Quarter. General prerequisites must include a course in logic or consent of the instructor. Mr. Avey.

A study of the transition from the traditional forms of Aristotelian Logic to the symbolic methods of the Nineteenth and Twentieth Centuries.

* Not given in 1946-1947.

*652. Philosophy of Science. Three credit hours. Autumn Quarter. Given in alternate years. General prerequisites must include either five hours of philosophy and ten hours of science, or twenty hours of science. Mr. Lowe.

A study and critical discussion of a few general interpretations of the methods and basic assumption of the natural and social sciences.

653. Philosophy of Religion. Five credit hours. Winter Quarter. General prerequisites must include five hours of philosophy. Mr. Evans.

The psychical and social nature of religion; a systematic examination of the fundamental religious conceptions—the idea of God in relation to the idea of the world, the idea of man, and the problem of human destiny.

656. Principles of Social Ethics. Three credit hours. Spring Quarter. General prerequisites must include one of the following: five hours of philosophy or Psychology 621, Education 603 or 632, or ten hours of social science. Mr. Reither.

Systematic development of a philosophy of human values, and its application to the chief forms and activities of civilized life—industrial and economic activities, the state, education, culture, and religion. The philosophies of Fascism, Naziism, Communism, and Liberal Democracy.

*661. Metaphysics of Knowledge and Nature. Three credit hours. Autumn Quarter. General prerequisites must include two of the following: Philosophy 601, 602, 603, 623, 625. Mr. Avey.

A systematic consideration of the nature of scientific method and the scientific conception of nature in its bearings on the problems of man.

662. Metaphysics of Personality and Values. Three credit hours. Spring Quarter. Given in alternate years. General prerequisites must include two of the following: Philosophy 601, 602, 603, 623, 625. Mr. Lowe.

A systematic consideration of the nature of the self and society, the problem of values, and the problem of the meaning of existence as a whole.

*665. Philosophy of History. Three credit hours. Spring Quarter. General prerequisites must include ten hours in philosophy and ten hours in the social sciences. Mr. Chandler.

A discussion of the place of history in the system of human knowledge, the humanistic significance of the historical attitude, the concepts of civilization, culture, development, and progress. The aim of the course is to formulate a philosophy of culture.

701. Minor Problems. Two to ten credit hours. Autumn, Winter, and Spring Quarters. Mr. Reither, Mr. Waters, Mr. Lowe.

Investigation of minor problems in the history of philosophy or systematic philosophy. Students ordinarily expect to take this course for from two to five credit hours, but honors students may receive credit up to ten hours.

Topics for special study may be chosen from the following fields: ethics, logic, metaphysics, history of philosophy, religion (including Hebrew ideas and Christian origins), aesthetics.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

These general prerequisites include acceptable foundation courses either in psychology, logic and ethics, or in the history of philosophy, and in some cases in all of these subjects.

801. Seminar in Systematic Philosophy. Three credit hours. Autumn Quarter. Mr. Chandler.

802. Seminar in Systematic Philosophy. Three credit hours. Winter Quarter. Mr. Reither.

803. Seminar in Systematic Philosophy. Three credit hours. Spring Quarter. Mr. Evans.

950. Research in Philosophy. Autumn, Winter, and Spring Quarters. All instructors.

* Not given in 1946-1947.

PHONETICS

(See Speech)

PHOTOGRAPHY

Office, 4 Brown Hall

ASSOCIATE PROFESSOR DAVIS, MR. REBER, MR. BINAU

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heaing, "DEPARTMENTS OF INSTRUCTION," page 46.

625. Scientific Photography. Three credit hours. Spring Quarter. Two lectures and recitations and two two-hour laboratory periods each week. General prerequisites must include a year of elementary or general chemistry and in addition at least twenty Quarter hours in a scientific major. Mr. Davis, Mr. Binau.

This course is designed for students of physics, chemistry, astronomy, biology, and other sciences who need a knowledge of the principles and techniques of photography as an aid to their scientific work. Special attention is given to the nature of photographic processes, characteristics of photographic materials and the applications of photography to science. The laboratory exercises will be selected as far as possible to meet the needs of individual students.

650. Advanced Photography. Three credit hours. Spring Quarter. Two lectures and two three-hour laboratory periods each week. General prerequisites must include a course in photographic processes or Photography 625. Mr. Davis, Mr. Binau.

A continuation of Photography 511 or 625, dealing mainly with projection printing, portraiture, special effects, photo-engraving, lens testing, color photography, miniature camera work and motion pictures.

699. Minor Problems in Photography. Three to five credit hours. Autumn and Winter Quarters. Conference, library and laboratory work. General prerequisites must include a course in photographic processes or Photography 625 and 650, and fifteen Quarter hours of elementary or general chemistry and/or physics and consent of the instructor. This course may be repeated until the student has accumulated not to exceed ten Quarter hours of credit. Mr. Davis, Mr. Binau.

This course is designed to permit a properly qualified student to avail himself of the library and laboratory facilities of the department for adding to his knowledge and techniques in some subject in photography and for carrying out minor investigations.

PHYSICAL EDUCATION

MEN'S DIVISION

Office, 124 Physical Education Building

PROFESSORS ST. JOHN, CASTLEMAN, OBERTEUFFER, OLSEN, SNYDER, ASHBROOK, WIDDOES, BIXLER AND GODFREY, ASSOCIATE PROFESSORS DUFFEE, STALEY, COBB, DANIELS, MOONEY, LARKINS, AND PEPPE, ASSISTANT PROFESSORS BIGGS, C. WIRTHWEIN, H. WIRTHWEIN, EDINGTON AND SELBY

WOMEN'S DIVISION

Office, 201 Pomerene Hall

PROFESSORS PALMER AND ARMSTRONG, ASSOCIATE PROFESSORS D. WIRTHWEIN, BOYNTON AND PATERSON, ASSISTANT PROFESSORS GILMAN, WATSON, STEIN, RUPERT, ALLENBAUGH, AND YOST

Prerequisites for Graduate Work: Unconditional admission to graduate work in physical education is based on presentation of credit from accredited institutions as follows: at least fifteen Quarter hours in professional education; at least nine Quarter hours in either human

anatomy or physiology or both; and at least twenty-four Quarter hours in physical and health education. These twenty-four Quarter hours (sixteen semester hours) must correspond with the Ohio teaching minor in physical and health education as established by the Ohio Department of Education. Candidates in health education only must possess the equivalent of the requirements listed by the University as the health education teaching field.

In cases where deficiencies in previous training are found, all or part of these prerequisites will be assigned and work toward their removal must be taken in addition to the general graduate degree requirements.

Undergraduate credentials must be submitted to one of the graduate advisers of the Department of Physical Education for appraisal.

Requirements for the Ph.D. Degree: Candidates for the Ph.D. degree must, in addition to fulfilling the requirements of the Graduate School, elect twenty hours of work in one field related to physical and health education chosen in conference with the committee assigned to the student.

Matters pertaining to the administration of the graduate program in physical and health education should be referred to the chairman of graduate courses in the department.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

†601. Principles of Football Coaching and Management (Men). Three credit hours. General prerequisites must include coaching experience.

A course for advanced students of football. The course will consider the principles underlying various types of football strategy, the designing of plays, methods of teaching and controlling players; also, special problems of management, such as those connected with selecting, handling equipment, and making trips.

615. Problems in Intramural Sports (Men and Women). Two credit hours. Spring Quarter. Two class meetings each week. Mr. Staley.

A critical analysis of intramural sports programs with a view to their justification from the standpoint of objectives, age level and contribution to the general welfare of the students participating. Problems of policy and administration of programs on the elementary, secondary, and college levels will be studied. Lectures, readings, reports, and discussions.

621. Principles of Physical Education (Men and Women). Five credit hours. Spring Quarter. Mr. Oberteuffer.

The nature of physical education, especially in relation to overlapping fields, such as health education and community recreation, and to education in general. A critical analysis of various objectives advanced; a review, with applications to physical education of modern conceptions of education and of modern principles in psychology and physiology.

625. Evaluation in Physical Education (Men and Women). Three credit hours. Winter Quarter. Two lectures and one two-hour laboratory period each week. Mr. Daniels.

A critical study of ways and means of evaluating biological, social and psychological outcomes of programs of physical education. Analyses of various specific tests and standards in use in schools will be made.

630. Individual Physical Education (Men and Women). Three credit hours. Autumn Quarter. Three lectures each week. General prerequisites must include Physical Education 693. Section for men, Mr. Daniels; section for women, Miss Gilman.

The problems underlying the need for an individual physical education program for handicapped students. The primary emphasis will be on the organization and administration of the individual physical education program in schools and colleges; the formulation of individual programs of physical education for the most prevalent types of disabilities found in the school population and the techniques necessary for effective accomplishment of the objectives of the program.

631. The Teaching of Contemporary Dance (Women). Three credit hours. Winter Quarter. One lecture and four laboratory periods each week. General prerequisites must include a course in the theory and practice of physical education or the equivalent. Miss Alkire.

Lectures, readings, and discussions of the dance as an art. The study of body movement as an expressive medium based upon analysis of old and new dance forms. Practice in program making and opportunity to assist in recital production.

† Not given during the academic year, 1946-1947.

632. Rhythmic Analysis (Men and Women). Three credit hours. Spring Quarter. Three laboratory meetings each week. General prerequisites must include permission of the Department adviser upon satisfactory evidence of knowledge and skill in dance. Miss Alkire.

A study of the rhythmic pattern of body movement in more complex dance forms; the kinesthetic theory of rhythmic perception, and the development of a discriminating sense of rhythmic values as carried into individual and group composition.

635. Current Problems in Physical Education for Girls and Women (Men and Women). Three credit hours. Spring Quarter. General prerequisites must include experience in teaching in schools or college. Miss Palmer.

A discussion of outstanding problems in the organization of physical education programs for girls and women: policies, activities, types of competition, point systems, awards, and athletic associations.

641. Personal Health Problems (Men and Women). Three credit hours. Autumn Quarter. Three discussion periods each week. Mr. Oberteuffer.

A study of the problems of living as they involve the health of the adult. Problems of the adjustment of the individual to conditions of rural and urban life. An informational and problems course. Serves also as a basic subject matter course for advanced study in health education.

643. Principles of Health Education (Men and Women). Three credit hours. Winter Quarter. Mr. Oberteuffer.

A basic survey of educational opportunities in health found in the various aspects of school life. Principles underlying the school health program. Survey of available teaching materials used in the classroom. Includes a study of official and non-official health agencies and their bearing upon the school health program. No discussion of the techniques of teaching.

644. The Teaching of Health in Secondary Schools and Colleges (Men and Women). Three credit hours. Spring Quarter. Three discussion periods each week. General prerequisites must include Physical Education 643 or the equivalent. Mr. Oberteuffer.

How to teach and what to offer in hygiene or health classes. Discussions of the methods and subject matter used in presenting hygiene to students. Includes a study of the opportunities for integration of health material with other subjects of the organized curriculum.

645. Administrative Interrelationships of School Health Education (Men and Women). Three credit hours. Winter Quarter. General prerequisites must include Physical Education 643. Miss Palmer.

This course proposes to continue the orientation of the student in matters of health education, with particular reference to public and organizational relationships. Problems of community preschool care, the follow-up work, community problems of programs for tuberculous children, crippled children, mental hygiene services. The relationships between the school personnel and medical, clinical, and nursing services in the community.

***646. Professional Preparation of Teachers in Physical and Health Education (Men and Women).** Three credit hours. Autumn Quarter. Three class meetings each week. Permission of the instructor must be obtained.

The principles underlying the professional training of teachers in physical and health education; curriculum construction; selection of candidates; supervised teaching; staff personnel; problems pertaining to professional students.

647. The Teaching of Physical Education (Men and Women). Three credit hours. Sections for Men and Women, Winter Quarter. Two lectures and three laboratory periods each week. Physical Education 621 must be included in the general prerequisites or taken concurrently and satisfactory proficiency in physical education activities. Section for men, Mr. Larkins; section for women, staff.

Lectures, discussions, demonstrations, and practice. Selection and organization of subject matter in different types of physical education classes. Techniques of instruction. Use of equipment. Modification of subject matter and procedure to meet varying school and community conditions.

648. The Teaching of Physical Education (Men and Women). Three credit hours. Spring Quarter. Two lectures and three laboratory periods each week.

* Not given in 1946-1947.

Physical Education 621 must be included in the general prerequisites or taken concurrently and satisfactory proficiency in physical education activities. Section for men, Mr. Ashbrook; section for women, staff.

A continuation of Physical Education 647.

649. Camp Administration (Men and Women). Three credit hours. Three lecture-laboratory periods each week. Lectures, readings, and field demonstrations. General prerequisites must include experience in camp counselling. Prerequisite for social administration students, Sociology 645. Prerequisite for physical education and education students, ten hours of sociology, and courses in the theory and practice of physical education. Mr. Staley.

The organization and direction of camps, particularly summer camps for boys and girls. Special attention is given to the social and educational program for adolescents. Designed for those preparing for administrative positions. Consideration of budgets, equipment, camp sites, program personnel. Practical observations and demonstrations.

Not open to students who have credit for Social Administration 649.

Available for graduate credit only for students majoring in education, physical education, and social administration.

651. Minor Problems in Physical Education (Men and Women). One to four credit hours. Autumn, Winter, and Spring Quarters. Permission of the adviser must be obtained. The staff.

Investigation of minor problems in the field of physical and health education.

682. Organization and Administration of Physical Education (Men and Women). Five credit hours. Winter Quarter. Five lectures each week. General prerequisites must include Physical Education 621 or equivalent. Section for men, Mr. Mooney; Section for Women, Miss Palmer, Mrs. Wirthwein.

The policies in the organization and administration of the Physical Education program; classification of students, staff, teaching load, time schedule, finances, etc. The administration of the Physical Education plant; gymnasium, locker rooms, swimming pool, equipment, records. Intra-school relationships.

685. Prevention and Care of Injuries (Men). Three credit hours. Autumn Quarter. Three lectures each week. General prerequisites must include ten hours of anatomy and physiology. Mr. Duffee.

A consideration of the methods of prevention and care of injuries occurring in physical education and competitive sports. The course also includes a discussion of the conditioning of men for athletic contests.

691. Kinesiology (Men and Women). Three credit hours. Section for men, Autumn Quarter, Mr. Stultz; section for women, Winter Quarter, Miss Stein. Four lecture-laboratory periods each week. General prerequisites must include acceptable courses in human anatomy and physiology.

The science of bodily movement. Basis for: prescription of activities in individual physical education; identification of common athletic injuries; form and style in athletic performance; analysis of coordination in sports, gymnastics, and ordinary activities of daily life.

Open only to majors in Physical Education.

692. The School Health Service (Men and Women). Three credit hours. Winter Quarter. Three lectures each week. General prerequisites must include Physical Education 643 or its equivalent. Mr. Duffee.

A consideration of the problems in connection with the health of the school child and teacher. Discussions and reports relating to medical inspection, physical examinations, symptoms and control of common school diseases, malnutrition, and the health environment of the school child. Observations in schools of physical examinations, systems of record keeping, follow-up services, malnutrition, and of the classes for the handicapped will be made.

693. Physical Examinations and Therapeutic Gymnastics (Men and Women). Five credit hours. Section for men, Autumn Quarter. Two lectures and three laboratory periods each week. Mr. Daniels. Section for women, Spring Quarter. Four lectures and one laboratory period each week. General prerequisites must include Physical Education 691. Miss Gilman.

A consideration of the school health examination: purposes, nature and methods of administering; the health examination as the basis of student classification for physical education;

health examination findings and physician's prescription as the foundation of the individual physical education program; study of the most common departures from normal with respect to defects, disabilities and symptoms of childhood handicaps; laboratory experience in use of the health examination, and program prescription for prevalent types of defects and disabilities encountered in the school population.

Open only to majors in Physical Education.

Not open to students who have credit for Physical Education 493.

NOTE: For course in the History of Physical and Health Education, see the Department of Education, Course 642.

For course in the Physiology of Exercise see the Department of Physiology, Course 640.

For course in Health Education for Teachers see the Department of Education, Course 664.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

801-802-803. Seminar in Physical and Health Education (Men and Women). Two credit hours each Quarter. Autumn, Winter, Spring. The Staff.

805. Physical Education in Schools and Colleges (Men and Women). Three credit hours. Autumn Quarter. General prerequisites must include Physical Education 621 or its equivalent. Mr. Oberteuffer.

An analysis of existing school and college programs considered in the light of acceptable practices in school administration. Will involve some case studies with summaries drawn in terms of principles. Arranged for students with teaching experience.

810. Survey of Research in Physical Education (Men and Women). Three credit hours. Autumn Quarter. Mr. Ashbrook.

A survey and evaluation of published reports of research in the field of physical education.

816. Problems in Interscholastic and Intercollegiate Athletics (Men and Women). Three credit hours. Winter Quarter. Mr. Daniels.

The relation of athletics to education; problems of athletic organization; eligibility; finance; current trends and developments in management and purpose; public relations.

820. Problems in Physical and Health Education (Men and Women). Three credit hours in (a) or (b) and not more than a total of six credit hours in the course as a whole. Winter Quarter. Three lecture and recitation periods each week. Mr. Oberteuffer, Miss Gilman, Mr. Daniels.

Advanced problems in the relation of physical and health education to health and public health. Students will work individually or in groups towards the solution of their chosen problem. Special investigation and experience in such areas as physiotherapy methods in the after care of infantile paralysis and other handicaps. Individual and group readings and form discussions.

(a) Health Education. Three credit hours. Mr. Oberteuffer.

(b) The Physically Handicapped. Three credit hours. Miss Gilman, Mr. Daniels.

823. Organic Science as Applied to Physical Education and Health Education. Five credit hours. Spring Quarter. General prerequisites must include ten hours of physiology, ten hours of chemistry, and ten hours of biology or its equivalent. Mr. Ashbrook.

This elective course has been planned for graduate students who need a systematic review of the fundamental sciences underlying physical and health education. It consists of an intensive series of lectures and demonstrations in the laboratory, supplemented by extensive reading. The purpose of the course will be to develop the integration of the sciences—chemistry, biology, anatomy, physiology—to the fields of physical education and health education.

826. Supervision of Physical and Health Education (Men and Women). Four credit hours. Autumn Quarter. Permission of the instructor is required. Miss Paterson.

A study of the opportunities and problems of the supervisor in city, county, and state school systems; the relations of the supervisor to the superintendent and to the teacher; rating

teachers; methods of assisting teachers. Separate units of the course will consider supervisors problem unique to the sexes.

950. Research in Physical and Health Education (Men and Women). Autumn, Winter, and Spring Quarters. The staff.

NOTE: For course in Public Recreation: Its Organization and Administration see the Department of Social Administration, Course 855.

PHYSICS AND ASTRONOMY

PHYSICS

Office, 107 Mendenhall Laboratory

PROFESSORS NIELSEN, BLAKE, LANDE, POOL, ALPHEUS SMITH, AND ALVA SMITH, ASSOCIATE PROFESSORS GREEN, HEIL, SHAFFER, SHAW, WILLIAMS, AND ZUMSTEIN, ASSISTANT PROFESSORS COOPER, HESTHAL AND OETJEN

Prerequisites for Graduate Work: Graduate work in physics presupposes the satisfactory completion of forty-five Quarter hours of undergraduate work in physics and chemistry and forty Quarter hours in mathematics including integral and differential calculus and differental equations. Students specializing in physics should have some knowledge of both organic and physical chemistry. If these requirements are not met at the time of admission, any deficiencies must be made up in excess of the regular requirements for a degree. Only students with high standing in their undergraduate work in physics, chemistry and mathematics will be admitted to graduate work in physics.

Requirements for the Master's Degree: The program of work leading to the Master's degree is not rigidly fixed. It is always planned after a consideration of the needs and interests of the student. In all cases it must provide an adequate foundation for further advanced work. (a) Each Quarter, prior to registration, a candidate for the Master's degree must plan his program with a member of the departmental Committee on Graduate Study. (b) Not later than two Quarters before the time at which the candidate expects to receive the Master's degree he must, after a conference with a member of the departmental Committee on Graduate Study, select the subject of his thesis and the instructor with whom he elects to work. (c) A reading knowledge of either French or German is highly desirable but not a fixed requirement.

Requirements for the Degree Doctor of Philosophy: The course of study to be pursued for the Doctor's degree is arranged for each student by the departmental Committee on Graduate Study after consultation with the student and his adviser. Work in other departments may be recommended according to the needs of the individual student. In all cases, proper consideration must be given to the mastery of the broad fundamental principles necessary for productive scholarship. (a) All candidates for the Doctor's degree in physics are required to complete Mathematics 721, 722, and 723, in excess of the work in mathematics offered for the Master's degree. Other courses in mathematics are highly desirable and in some cases indispensable. (b) A reading knowledge of both French and German is required and students are advised to meet this requirement as early as possible. (c) Not later than four Quarters before the student expects to receive the Ph.D. degree he must, after a conference with a member of the departmental Committee on Graduate Study, select the field of his dissertation and the instructor under whose direction he elects to work. (d) Before being admitted to candidacy for the Doctor's degree the applicant is required to pass a written examination on theoretical mechanics and its applications; physical optics and atomic physics; electromagnetic phenomena; kinetic and quantum theory of matter; and mathematical methods in physics. These written examination are followed by an oral examination as required by the Graduate School.

Colloquium and Journal Club: Reports on current topics in physics and related fields are presented by graduate students and instructors at weekly meetings of the Theoretical Colloquium, the Journal Club and seminars on special subjects. All graduate students are expected to attend the Journal Club regularly and to take part in these discussions.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

Unless otherwise indicated, the prerequisites for "600" courses are one year of calculus and one year of college physics.

608. Advanced Electricity. Four credit hours. Autumn Quarter. Four lectures and recitations each week. Mr. Heil.

An introductory course in the mathematical theory of electricity and magnetism. The topics treated are electrostatic fields, magnetostatic fields, magnetic fields of steady currents, dielectric polarization, magnetization.

609. Molecular Physics and Heat. Four credit hours. Spring Quarter. Four lectures and recitations each week. Mr. Landé.

Introduction to the fundamental ideas of thermodynamics and statistical mechanics with an extended discussion of the kinetic theory of gases; equation of state of ideal and real gases; transfer phenomena; Brownian motion; classical and modern theories of specific heats; temperature radiation; thermal excitation of spectra.

610. Conduction of Electricity through Gases. Four credit hours. Winter Quarter. Four lectures and recitations each week. Mr. Heil.

An introductory course on the passage of electricity through gases and evacuated tubes, ionic velocities, photo-electricity, cathode rays and positive rays, radioactivity, elementary introduction to electron theory of matter, etc.

612. Periodic and Transient Electric Currents. Four credit hours. Spring Quarter. Three lectures and recitations and one two-hour laboratory period each week. Mr. Alva Smith.

Transient and stationary states in electrical circuits containing impulsive or periodic electromotive forces treated by the methods of differential equations and vector analysis; periodic and aperiodic currents in single circuits with resistance, inductance and capacity in series or parallel; coupled circuits; resonance phenomena; damped oscillations; theory of alternating current bridge measurements; pulsating currents; Fourier's analysis of periodic non-sinusoidal wave forms; electromagnetic radiation.

615. Introduction to Nuclear Physics. Four credit hours. Autumn Quarter. Given in alternate years. Mr. Pool.

Review of recent experimental methods and data on transmutation of the elements by bombardment with protons, deuterons, neutrons, and alpha rays; artificial radioactivity; detection of nuclear disintegration products. Simple experiments are performed with cloud chambers, geiger counters, ionization chambers and the cyclotron.

616. Advanced Physical Laboratory. Three to twenty-four credit hours. All Quarters. Two three-hour laboratory periods each week. General prerequisites must include one year of college physics. Mr. Heil.

This course is intended to give the advanced student in science practice in precise physical measurements, involving the use of high grade mechanical, optical, electrical and thermal instruments.

The work undertaken will be elected from the following topics:

a. **Mechanics and Heat.** Exact measurements involving determinations of elasticities of solids, moments of inertia, torsional rigidity, torsional hysteresis, "g" by physcal pendulum, coefficients of viscosity, density of gases and vapors, hygrometry, specific heats, thermo-electromotive forces; determination of heats of combustion of fuels by means of high grade calorimeters, etc.

b. **Advanced Optical Measurements.** Exact determinations of indices of refraction by means of spectrometers, wave lengths by means of ruled gratings and interferometers, dispersion, polarization, absorption, analysis of spectra, etc.

c. **Advanced Electrical Measurements.** Exact measurements of currents, resistances, electromotive forces, magnetic permeability, capacity and inductance, transient phenomena involving the determination of time constants of circuits; fundamental alternating current measurements; the use of the oscillograph in the study of alternating and transient currents.

d. **Advanced Measurements in Ionization and Radioactivity.** Use of electrometers and electroscopes for exact measurements of currents in gases, saturation currents, discharge of electricity and ionizing properties of radioactive materials, absorption of radiation; ionizing properties of flames and incandescent solids; characteristic curves of thermionic vacuum tubes and applications, photo-electricity, etc.

e. **Pyrometry and High Temperature Measurements.** Thermo-electric pyrometers, resistance thermometers, optical pyrometers, total radiation pyrometers, temperature recorders and controlling devices, transition points and thermal analysis at high temperatures.

f. **Acoustics.** Measurements of frequency, intensity and velocity of sound; comparison of wave forms; forced vibrations and resonance; acoustical dust figures; acuity of hearing; acoustical characteristics of rooms.

g. **Spectroscopy.** Study of characteristics and measurement of wave lengths of visible, ultra-violet and infra-red spectra.

Any one of the above topics may be selected during any Quarter with the exception of topic (d), which is offered only during the Winter Quarter.

A student may repeat this course until he has obtained a maximum of twenty-four credit hours. Only three credit hours may be taken during any Quarter except during the Summer Quarter, when six credit hours may be obtained. A student may accumulate not more than six credit hours in any *one* of the above topics.

*617. **Physical Optics and Optical Instruments.** Four credit hours. Autumn Quarter. Three lectures and recitations and one two-hour laboratory period each week. Given in alternate years.

An introductory course in physical optics covering the following topics: light sources; nature, propagation and velocity of light; optical phenomena such as refraction, reflection, interference, diffraction and polarization; absorption, scattering and dispersion of light; optical activity; fluorescence and phosphorescense; characteristics and uses of optical instruments.

618. **Modern Atomic Spectroscopy.** Four credit hours. Winter Quarter. Four lectures and recitations each week. Mr. Green.

A discussion of the phenomena of line spectra of atoms, including interpretation of the hydrogen spectrum according to Bohr's orbit theory and in terms of the quantum mechanics; classification and explanation of line series; interpretation of multiplet structure in complex spectra by means of the vector model of the atom. Special topics discussed include allowed energy states and quantum numbers, selection rules for transitions, line intensities, neutral and ionized states, ionization potentials, Zeeman effect, Stark effect, forbidden transitions, isoelectronic sequences, etc.

*619. **Spectra and Structure of Molecules.** Four credit hours. Spring Quarter. Four lectures and recitations each week. Given in alternate years.

Review of experimental methods and data on band spectra of molecules; empirical classification of spectra and correlation with molecular energy states; relation of energy expressions to molecular structure; selection rules and intensities of transitions; macroscopic properties of molecules obtained from band spectra; applications to chemical problems.

*620. **X-rays and Atomic Structure.** Four credit hours. Winter Quarter. Four lectures and recitations each week. Mr. Landé.

Production, measurement and effects of X-rays, including gamma rays; classical electron theory of the reflection, refraction, absorption and scattering of X-rays; quantum theory of the origin of X-ray spectra and structure of heavy atoms.

621. **Acoustics.** Four credit hours. Autumn Quarter. Four lectures and recitations each week. Given in alternate years. Mr. Zumstein.

A discussion of wave motion, forced vibrations, origin, propagation, velocity, interference, diffraction, resonance and energy relations of sound waves, vibration of strings and organ pipes, speech sounds, acoustics of buildings, etc.

622. **Thermionics and High Vacuum Phenomena.** Four credit hours. Spring Quarter. Four lectures and recitations each week. Mr. Heil.

Physical theory of thermionic emission; discharge from incandescent solids in gases and vacua; effect of space charge and electrode potentials on currents in vacuum tubes; production and measurement of high vacua; application of thermionic devices to rectification, production and detection of electrical oscillations; measurement of low pressures; excitation potentials.

626. **Methods of Theoretical Physics.** Three credit hours. Autumn Quarter. Three lectures and recitations each week. Mr. Shaffer.

An introductory course coordinating the methods of solving problems in such fields of classical physics as dynamics of particles and systems of particles, wave motion, electrodynamics, heat flow, etc. The course is especially adapted to needs of students in chemistry and engineering but is also open to students majoring in physics.

627. **Introduction to Chemical Physics.** Three credit hours. One Quarter. Autumn and Winter. Three lectures and recitations each week. Mr. Shaffer.

A course dealing with topics in modern physics which are of particular interest to chemists, including the electrical nature of matter, introductory quantum mechanics, discrete and continuous spectra of atoms and molecules, predissociation, nature of the chemical bond, quantum mechanical resonance, etc.

629. **Experimental Infra-red Spectroscopy.** Four credit hours. Spring Quarter. One lecture and two three-hour laboratory periods each week. Mr. Nielsen.

A course in experimental techniques of infra-red spectroscopy; sources and detectors of infra-red radiation; design, adjustment and operation of various types of prism and prism-grating infra-red spectrometers; assembling and interpretation of simple data.

630. **Minor Problems in Physics.** One to fifteen credit hours. Any Quarter. Conference, library, and laboratory work. General prerequisites must

* Not given in 1946-1947.

include satisfactory advanced courses in general experimental and theoretical physics. All instructors.

This course is designed to permit any properly qualified student to avail himself of the library and laboratory facilities of the department for adding to his knowledge and techniques in some subject in physics, for repeating classical physical experiments, or for carrying out minor investigations. Among the topics on which experimental work can be arranged are the following:

(a) Acoustics
(b) Chromatic photometry
(c) Electrical and magnetic measurements at different frequencies
(d) High vacuum phenomena and techniques
(e) Photoelectricity and thermionics
(f) Pyrometry
(g) Radioactivity and atomic disintegration
(h) Visible, ultra-violet, and infra-red spectroscopy
(i) X-rays and crystal structure

Students who have specialized interest in some field of physics may elect this course to secure an opportunity for *independent reading and study* under the supervision of an instructor. The student will be permitted to choose the instructor and, subject to his approval, the field in which this reading is to be done.

*640. Modern Physics. Three credit hours. This course cannot be counted toward a major in physics. General prerequisites must include one year of college physics.

This course is intended primarily for teachers of physics, chemistry, and general science in the secondary schools. It presents in a simple, non-mathematical manner recent advances in physics, with numerous illustrations and applications. The subject matter is organized in a way to make it available for teachers in secondary schools.

645. Acoustics for Students of Music and Speech. Three credit hours. Winter Quarter. This course cannot be counted toward a major in physics. Mr. Shaffer.

An elementary, non-mathematical treatment of acoustics with applications to music, including the following: production, amplification, propagation, and detection of sound waves; characteristics of tones; overtones; resonance; reverberation; localized echoes; phase effects; hearing; musical instruments; acoustical apparatus, etc.

*647. Physics of the Atmosphere. Three credit hours. Autumn Quarter. Three class meetings each week.

Application of principles of physics to such atmospheric processes as heating and cooling, motion of air masses, temperature variations, evaporation and condensation, radiation; electrical, optical and acoustical phenomena of the atmosphere.

*754. X-rays and Crystal Structure. Four credit hours. Winter Quarter. Four lectures and recitations each week. General prerequisites must include calculus and one year of college physics. Given in alternate years. Mr. Blake, Mr. McCaughey, Mr. Harris.

This course is designed for those students of physics, chemistry, and mineralogy who intend to do research work in crystal structures and X-ray analysis.

This course is the same as Mineralogy 754 and Chemistry 754.

Not open to students who have credit for Physics 654, Mineralogy 654 or Chemistry 654.

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Education. Course 684.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

A reading knowledge of German and French is highly desirable.

801. Electromagnetic Theory of Light. Three credit hours. Spring Quarter. General prerequisites must include Physics 617. Mr. Landé.

Resolving power of optical instruments. Maxwell's theory of light. Polarization, refraction, and absorption. Propagation of light in crystals. Electronic theory of dispersion. Electro- and magneto-optics.

* Not given in 1946-1947.

*803-*804. **Thermodynamics.** Three credit hours. Autumn and Winter Quarters. General prerequisites must include Physics 609 and Mathematics 601 and 611 or their equivalents.

This course deals with the fundamental principles of thermo-dynamics and their application to such topics as osmotic pressure, electrolytic conduction, diluted and concentrated solutions, the phase rule, chemical equilibrium, metastability of matter, Nernst's heat theorem and the modern theories of specific heats.

805-806. **Electromagnetic Field Theory.** Three credit hours. Autumn and Winter Quarters. General prerequisites must include Physics 609 and Mathematics 601 and 611 or their equivalents. Mr. Alva Smith.

Electro- and magneto-statics. Maxwell's theory of electrodynamics. Propagation of electro-magnetic waves. Vibrations. Electro-magnetic phenomena in bodies at rest and in motion. Principle of relativity.

813. **Line Spectra and Atomic Structure.** Three credit hours. Spring Quarter. General prerequisites must include Physics 618 and 627 or 818. Mr. Green.

Interpretation of spectral series, stationary states and term values, spinning electrons and fine line structure, vector models of atoms, Zeeman effect and Stark effect, intensity and polarization of spectral lines, Pauli's exclusion principle, hyperfine structure and nuclear moments.

817-818. **Quantum Mechanics.** Three credit hours. Autumn and Winter Quarters. General prerequisites must include Mathematics 601 and 611 or their equivalents and should include Physics 618 or 619. Mr. Landé.

Contrast between waves and particles. Uncertainty principle. Schrödinger's wave equation. Perturbation theory. Spectral lines of atoms and molecules. Compton and Raman effects. Molecular forces. Quantum statistics.

819. **Advanced Quantum Mechanics.** Three credit hours. Spring Quarter. General prerequisites must include Physics 818. Mr. Landé.

A topic such as the quantum theory of radiation, of solid bodies, or of atomic nuclei, will be discussed in detail

820. **The Atomic Nucleus and Nuclear Transmutations.** Three credit hours. Spring Quarter. General prerequisites must include Physics 615 and 817 or their equivalents. Mr. Pool.

Nuclear mechanical moments, magnetic dipole moments and electric quadrupole moments are considered in their relations to nuclear transmutation probabilities. The statistics of nuclear particles and nuclear binding forces are discussed. Radioactive transformations, both natural and artificial, are studied. Alpha- beta- and gamma-ray spectra are interpreted in terms of nuclear energy level diagrams. Scattering problems involving electons, protons and neutrons are discussed.

824. **Statistical Mechanics.** Three credit hours. Autumn Quarter. General prerequisites must include Physics 609, 627 or 818 and 840. Mr. Landé.

Statistical mechanics and its relation to thermodynamics and to quantum theory; classical, Fermi-Dirac, and Einstein-Bose statistics; statistical equilibrium and steady change. Applications to the specific heats of gases and crystals, vapor pressure, chemical equilibrium, imperfect gases, dissociation and ionization, thermionics, temperature radiation, fluctuation and Brownian movement, viscosity and conduction of heat and electricity.

825. **Applications of Statistical and Quantum Mechanics.** Three credit hours. Spring Quarter. General prerequisites must include Physics 824 or permission of the instructor. Mr. Nielsen.

The application of quantum mechanics to a special problem such as the second quantization of fields; the theory of magnetism; the application of atomic theory in a special field such as astrophysics; the theory of the solid state. The topic for the year will be selected from the above list according to the interests of the students registered for the course.

840-841-842. **Fundamental Theoretical Physics.** Five credit hours each Quarter. Autumn, Winter, Spring. Five lectures and recitations each week.

* Not given in 1946-1947.

General prerequisites must include Mathematics 601 and 611 and three Quarters of "600" Physics. Mr. Thomas.

This course covers topics of theoretical physics selected from: dynamics of a particle, dynamics of rigid and deformable bodies, hydrodynamics, dynamical theory of gases, electrodynamics and quantum dynamics.

851. Molecular Spectra I. Three credit hours. Autumn Quarter. General prerequisites must include introductory courses in spectroscopy and quantum mechanics. Given in alternate years. Mr. Nielsen.

Separation of the electronic, vibrational and rotational aspects of the spectra of molecules; derivation of quantum-mechanical Hamiltonian for vibrating and rotating molecules; discussion of wave functions, allowed energies and selection rules of harmonic oscillators and of symmetric and asymmetric rotators; interactions between oscillation and rotation; origin and interpretation of rotation-vibration spectra.

852. Molecular Spectra II. Three credit hours. Winter Quarter. General prerequisites must include introductory courses in spectroscopy and quantum mechanics. Given in alternate years. Mr. Nielsen.

General theory of gyro-vibronic energy states of molecules; symmetry properties of various molecular configurations and group theory classification of energy states; origin and interpretation of electronic spectra of diatomic and polyatomic molecules; applications of data on molecular spectra to related chemical and physical phenomena. It is desirable but not necessary that Physics 851 be taken before this course.

†860-*861-862. Mathematical Physics. Three credit hours. Autumn, Winter, and Spring Quarter. General prerequisites must include Physics 625 or its equivalent.

Advanced mathematical methods and their application to various branches of theoretical physics such as: advanced Hamiltonian dynamics; advanced potential theory; mathematical theory of elasticity; theoretical hydro- and aero-dynamics; the principle of relativity in physics. The topic for a given Quarter will be selected from the above list according to the interests of the students registered for the course. The three Quarters will in general be independent and may be taken separately.

950. Research in Physics. Autumn, Winter, and Spring Quarters. Library, conference, and laboratory work. General prerequisites must include acceptable courses in physics and mathematics. The student may spend a part or all of his time on his chosen field of research. This course is intended primarily to meet the needs of students who must complete either a thesis or a dissertation as part of the requirements for a degree. Department staff.

ASTRONOMY

Office, Emerson McMillin Observatory

PROFESSOR MANSON

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

*605. Introduction to Celestial Mechanics. Four credit hours. Winter Quarter. Four lecture and recitation periods each week. General prerequisites must include one year of calculus and ten Quarter hours of astronomy or ten Quarter hours of physics. Given in alternate years.

A discussion of rectilinear motion under the law of inverse squares and the law of direct distance; potential and attraction; the problem of two bodies; the general integrals of the problem of 'n' bodies; the restricted problem of three bodies; introductory discussion of lunar theory.

*606. Orbits. Four credit hours. Winter Quarter. Four lecture and recitation periods each week. General prerequisites must include one year of calculus and ten Quarter hours of astronomy or ten Quarter hours of physics. Given in alternate years. Mr. Manson.

A discussion of the computation of positions of planets or comets in elliptical and parabolic orbits. The computation of orbits of planets and comets. Perturbations. Orbits of binary stars

* Not given in 1946-1947.

† Not given during the academic year 1946-1947.

611. Minor Problems in Astronomy. Three to nine credit hours. Autumn, Winter, and Spring Quarters. Conference, library and laboratory work. General prerequisites must include a course in stellar astronomy or astronomy of the solar system. A student may repeat this course until he has earned a total of nine credit hours but not more than three credit hours may be taken in one Quarter. Mr. Manson.

This course is designed to permit properly qualified students to avail themselves of the facilities of the Observatory to work independently on a special problem in practical astronomy, to develop the necessary techniques for the successful use of astronomical instruments and to get some acquaintance with the methods of astronomical research. Each problem must be selected after consultation with the instructor in charge of the course.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

950. Research in Astronomy and Astrophysics at the Perkins Observatory. Autumn, Winter, and Spring Quarters. General prerequisites include acceptable courses in astronomy, mathematics, and physics. Subject of research must be chosen after consultation with the Director. The course may be repeated as often as necessary in pursuit of any special research. (See page 11 for research facilities offered by the Perkins Observatory.)

PHYSIOLOGICAL CHEMISTRY, PHARMACOLOGY, AND MATERIA MEDICA

Office, 108 Hamilton Hall

PROFESSORS SMITH AND BROWN, ASSOCIATE PROFESSOR WIKOFF, ASSISTANT PROFESSORS RUGGY AND ROSENFELD

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

These prerequisites include fundamental courses in general chemistry, qualitative and quantitative analysis and organic chemistry.

Courses 601, 602, 609, 610, and 671 are open only to students doubly registered in the College of Medicine and the Graduate School. Courses 632 and 633 are open only to students doubly registered in the College of Dentistry and the Graduate School. (See page 31.)

Qualifying Examination for the Master's Degree: At least one Quarter prior to the Convocation at which he expects to receive the Master's degree the candidate must pass a written examination covering general inorganic chemistry, analytical chemistry, and the fundamentals of organic chemistry. He must also give evidence of his ability to read articles in his field written in the German or French language.

PHYSIOLOGICAL CHEMISTRY

601. Physiological Chemistry. Four credit hours. Autumn Quarter. Two lecture and two quiz hours each week. Physiological Chemistry 609 must be taken concurrently. Mr. Brown.

The chemistry of carbohydrates, lipids, and proteins.

Not available for graduate credit for students majoring in physiological chemistry.

602. Physiological Chemistry. Four credit hours. Winter Quarter. Two lectures and two quiz hours each week. General prerequisites must include Physiological Chemistry 601. Mr. Brown.

The chemistry of digestion, metabolism, and excretion.

Not available for graduate credit for students majoring in physiological chemistry.

609-610. Physiological Chemistry Laboratory. Two credit hours. Autumn and Winter Quarters. Six laboratory hours each week. Physiological Chemistry 601 must be included as a prerequisite or must be taken concurrently. Mr. Ruggy.

Laboratory work demonstrating the properties of fats, carbohydrates and proteins during the Autumn Quarter. In the Winter Quarter experiments concerning the chemistry of digestion, metabolism and excretion together with a consideration of the chemistry of the tissues.

611. Physiological Chemistry. Five credit hours. Autumn Quarter. Three lecture-quiz hours and six laboratory hours each week. General prerequisites must include quantitative analysis and Chemistry 647, 648, 649, 650. Miss Wikoff.

The chemistry of carbohydrates, lipids, and proteins.

Not open to students who have credit for Physiological Chemistry 601. Not available for graduate credit for students majoring in physiological chemistry.

612. Physiological Chemistry. Five credit hours. Winter Quarter. Three lecture-quiz hours and six laboratory hours each week. General prerequisites must include Physiological Chemistry 611. Miss Wikoff.

The chemistry of digestion, metabolism, and excretion.

Not open to students who have credit for Physiological Chemistry 602. Not available for graduate credit for students majoring in physiological chemistry.

613. Quantitative Method of Blood Analysis. Three credit hours. Spring Quarter. One lecture and six laboratory hours each week. General prerequisites must include Physiological Chemistry 602 or 612. Miss Wikoff.

Determination of important constituents of the blood.

614. Biochemical Methods of Analysis (Food Analysis). Five credit hours. Autumn Quarter. Two hours of lecture or quiz and nine laboratory hours each week. General prerequisites must include Physiological Chemistry 611. Miss Wikoff.

The quantitative analysis of the proteins, fats, and carbohydrates. Special methods for the analysis of biological materials.

618. Toxicology and Legal Medicine. Two or four credit hours. Winter Quarter. Two lecture and six laboratory hours each week. For four credit hours, general prerequisites must include acceptable courses in quantitative analysis and organic chemistry. Mr. Smith.

A course dealing with that portion of medical knowledge which may be of assistance in serving the needs of law and justice including the effects and detection of poison.

619. Minor Problems in Physiological Chemistry. Two to fifteen credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include Physiological Chemistry 614. A student may repeat this course and may spend all or part of his time on it during a Quarter. Mr. Smith, Mr. Brown, Miss Wikoff.

This course is designed to permit any properly qualified person to avail himself of the facilities of the department for carrying out a minor investigation or for adding to his knowledge and technique in physiological chemistry. A student may exercise complete freedom in his choice of instructor to direct his work in this course.

632. Physiological Chemistry. Six credit hours. Spring Quarter. Four lecture or quiz hours and six laboratory hours each week. Mr. Brown.

The chemistry of the carbohydrates, lipids, and proteins; together with the chemistry of digestion, absorption, metabolism, and excretion; the tissues; the internal secretions.

633. Physiological Chemistry. Two credit hours. One lecture and one quiz hour each week. General prerequisites must include Physiological Chemistry 632. Mr. Brown.

The elements of human nutrition; the effects of diets on the human body; the relation of diets to dentistry.

715. Biochemical Biography. One credit hour. Spring Quarter. General prerequisites must include Physiological Chemistry 612. Required of all candidates for graduate degrees in physiological chemistry. Miss Wikoff.

PHARMACOLOGY

671. Pharmacology. Four credit hours. Spring Quarter. Three lecture or quiz hours and three laboratory hours each week. General prerequisites must include Physiology 635, 636 and Physiological Chemistry 602 or 612. Mr. Smith, Mr. Rosenfeld, Mr. Ruggy.

This course treats of the modification of the normal physiological processes of the body by the presence of the more common drugs used in medicine.

672. Pharmacology. Two credit hours. Winter Quarter. Two lecture or conference hours each week. General prerequisites must include Pharmacology 670. Mr. Smith, Mr. Rosenfeld, Mr. Ruggy.

A continuation of the material presented in Pharmacology 670 with special emphasis on chemotherapy and toxicology.

This course is open to students in the College of Medicine only.

675. Methods of Biologic Drug Assay. Three credit hours. Spring Quarter. Two lectures and one three-hour laboratory period each week. General prerequisites must include fundamental courses in biology and chemistry in addition to permission of the instructor. Mr. Smith.

This course includes consideration of the methods in common use for the biological standardization of drugs.

676. Minor Problems in Materia Medica and Pharmacology. Two to fifteen credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include acceptable courses in chemistry or pharmacology. A student may repeat this course and may spend all or part of his time on it during a Quarter. Mr. Smith, Miss Wikoff.

This course is designed to permit any properly qualified person to avail himself of the facilities of the department for carrying out a minor investigation or for adding to his knowledge and technique in materia medica or pharmacology. A student may exercise complete freedom in his choice of instructor to direct his work in this course.

750. Pharmacology. One credit hour. Winter Quarter. One lecture or lecture-demonstration each week. The staff.

A series of lectures and case-demonstrations illustrating recent advances in the chemotherapy of disease. Offered in cooperation with the Department of Medicine.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

PHYSIOLOGICAL CHEMISTRY

813. Seminar in Physiological Chemistry. Two credit hours. Spring Quarter. General prerequisites must include Physiological Chemistry 612. Mr. Smith.

821. Advanced Physiological Chemistry. Three credit hours. Autumn Quarter. Three lectures each week. General prerequisites must include Physiological Chemistry 602 or 612, or Chemistry 841, 842, 843. Miss Wikoff.

A graduate course covering the carbohydrates, lipids, and proteins for students who wish to emphasize the chemical aspect of their training.

* Not given in 1946-1947.

822. **Advanced Physiological Chemistry.** Three credit hours. Winter Quarter. Three lectures each week. General prerequisites must include Physiological Chemistry 602 or 612 or Chemistry 841, 842, 843. Mr. Brown.

An advanced course covering the chemistry of metabolism, tissues, hormones and vitamines.

825-826. **Advanced Physiological Chemistry Laboratory.** Three credit hours. Autumn and Winter Quarters. Nine hours of library, conference and laboratory work each week. Physiological Chemistry 821 and 822 must be included in the general prerequisites or taken concurrently. Staff.

Advanced courses in biological preparation including the isolation of enzymes, carbohydrates, lipids, proteins and such hormones as epinephrin and insulin.

830. **Chemistry of Medicinal Substances.** Three credit hours. Winter Quarter. Three conference hours each week. General prerequisites must include Physiological Chemistry 611, 612, or Chemistry 841 and 842. Mr. Smith.

PHARMACOLOGY

850. **Experimental Pharmacodynamics.** Five credit hours. Autumn Quarter. Three conference or lecture hours and six laboratory hours each week. General prerequisites must include acceptable courses in physiology and chemistry including Physiological Chemistry 602 or 612. Mr. Smith.

This course deals with the actions of drugs on the normal physiological processes, apart from therapeutics, and with some of the theories which seek to explain these actions.

RESEARCH

950. **Research in Physiological Chemistry and Pharmacology.** Autumn, Winter, and Spring Quarters. Research in Physiological Chemistry will be conducted under the guidance of Mr. Smith, Mr. Brown, Miss Wikoff; research in Materia Medica under the guidance of Mr. Smith, Miss Wikoff.

PHYSIOLOGY

Office, 204 Hamilton Hall

PROFESSORS HARTMAN, SEYMOUR (EMERITUS), AND HITCHCOCK, ASSOCIATE PROFESSORS BOZLER AND DURRANT (EMERITUS), ASSISTANT PROFESSORS ANGERER AND RING, MR. SHELDEN, MR. SMITH, MR. THATCHER, MR. WHITEHORN

Prerequisites for graduate students majoring in physiology are the following courses or their equivalents: Courses in elementary chemistry and Chemistry 647, 648, 649, and 650 or equivalent; Courses in elementary zoology. Courses in general physics are desirable.

Requirements for the Master's Degree: See General Requirements in regard to thesis and final examination (pages 35 and 36).

Requirements for the Degree of Doctor of Philosophy: See General Requirements (page 42).

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTIONS," page 46.

601. **Advanced Physiology.** Seven credit hours. Autumn Quarter. Five lectures and six laboratory hours each week. General prerequisites must include two Quarters of chemistry and three Quarters of biology. Permission of the department chairman must be obtained. Department staff.

This course deals with cardiovascular system, body fluids, excretion, respiration, and digestion.

602. **Advanced Physiology.** Eight credit hours. Winter Quarter. Five lectures, one conference, and six laboratory hours each week. General prerequisites must include Physiology 601. Department staff.

Metabolism, endocrine system, neuromuscular system, central nervous system, and sense organs.

604. Advanced Physiology. Five credit hours. Autumn Quarter. Three lecture or recitation hours and six laboratory hours each week. Open only to students registered in the College of Dentistry. Mr. Hitchcock and staff.

The course deals with body fluids, cardiovascular system, respiration, digestion, excretion, and deurolmuscular system.

Not open to students who have credit for Physiology 601.

605. Advanced Physiology. Seven credit hours. Winter Quarter. Five lecture or recitation hours and six laboratory hours each week. Open only to students registered in the College of Dentistry. General prerequisites must include Physiology 604 or equivalent biological training. Mr. Hitchcock and staff.

A continuation of Physiology 604 dealing with metabolism, nutrition, endocrines, reproduction, and sense organs.

Not open to students who have credit for Physiology 602.

*625. Advanced Mammalian Physiology. Five credit hours. Winter Quarter. Two lectures and three three-hour laboratory periods each week. General prerequisites must include Physiology 626, 627, 628 or equivalent. Department staff.

An advanced course in the physiology of the mammal, based largely on laboratory experiments.

626. Comparative Physiology. Five credit hours. Autumn Quarter. Four lecture hours and three laboratory hours each week. General prerequisites must include two Quarters of Chemistry and three Quarters of biological sciences. Department staff.

General properties of cells (including contractility and irritability), the body fluids, the circulation, and the kidney in different animal types.

627. Comparative Physiology. Five credit hours. Winter Quarter. Four lecture hours and three laboratory hours each week. General prerequisites must include Physiology 626. Department staff.

Metabolism, respiration, digestion, secretion, and excretion in different animal types.

628. Comparative Physiology. Five credit hours. Spring Quarter. Four lecture hours and three laboratory hours each week. General prerequisites must include Physiology 627. Department staff.

Hormones, nervous system and sense organs in different animal types.

*629. Endocrinology and Metabolism. Five credit hours. Spring Quarter. Four lectures or recitations and one three-hour laboratory period each week. General prerequisites must include two Quarters of physiology or equivalent biological sciences. Department staff.

A survey of animal metabolism and of the endocrine system with emphasis on their interrelationships.

*630. Advanced Physiology of the Endocrine System. Five credit hours. Spring Quarter. Four lectures and three laboratory hours each week. General prerequisites must include Physiology 626, 627, and 628, or equivalent. Department staff.

A study of the functions of the thyroid, parathyroid, pituitary, adrenal, pancreas, gonads, and other organs with possible endocrine function.

635. Advanced Physiology. Seven credit hours. Autumn Quarter. Five lectures and six laboratory hours each week. Open only to students registered in the College of Medicine. Mr. Bozler and staff.

Cardiovascular system, body fluids, excretion, respiration, and digestion.

636. Advanced Physiology. Eight credit hours. Winter Quarter. Five lectures, one conference, and six laboratory hours each week. Open only to

* Not given in 1946-1947.

students registered in the College of Medicine. General prerequisites must include Physiology 635. Mr. Bozler, Mr. Hartman, and staff.

Metabolism, endocrine system, neuromuscular system, central nervous system and sense organs.

640. Physiology. Five credit hours. Winter Quarter. Three lectures and two three-hour laboratory periods each week. Mr. Hitchcock and staff.

A course in the neuromuscular and integrative systems with particular reference to exercise.

700. Minor Problems. Three to fifteen credit hours. Autumn, Winter, and Spring Quarters. Designed for qualified students who wish to begin research. Permission of department chairman required. Department staff.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

815-816-817. Seminar in Physiology. Two credit hours. Autumn, Winter, and Spring Quarters. Required of all students majoring in physiology. Department staff.

950. Research in Physiology. Autumn, Winter, and Spring Quarters. General prerequisites must include Physiology 601 and 602 or equivalent courses and the permission of the department chairman.

The department is prepared to supervise research in circulation, endocrinology, metabolism, and muscle physiology.

POLITICAL ECONOMY

(See Economics and Sociology)

POLITICAL SCIENCE

Office, 100 University Hall

PROFESSORS SPENCER, WALKER, HELMS, AND AUMANN, ASSOCIATE PROFESSOR HEIMBERGER, ASSISTANT PROFESSORS FOSTER AND BALLIS

Departmental Committee on Graduate Work: General supervision of all phases of the graduate program (including curriculum and the acceptance and retention of students) is exercised by a graduate committee of the Department. Each candidate for graduate work in political science or public administration shall submit to this graduate committee a statement of educational background, interests and aims. The graduate committee also requires progress reports at regular intervals concerning each such student.

Each graduate student enrolled in political science or public administration is placed under the immediate supervision of an advisory committee of three or more persons representing the departments in which the student is taking a substantial amount of work, at least two of whom are members of the department of political science. Each advisory committee is named by the graduate committee (which designates one of the number as chairman); and reports periodically to the graduate committee on the progress of the student. The student shall consult each member of his advisory committee at intervals concerning his program of study and in the preparation of his thesis or dissertation. In the case of the Master's degree, final approval of the thesis rests with the advisory committee whose members normally constitute also the oral examining committee.

Requirements for the Degree Doctor of Philosophy:

A. The fields of concentration in the Department of Political Science shall be recognized as follows:

I. Theory: 621, 622, 623 (611, 615, 627, 628, 629)

II. International Law and Relations: 612, 613, 649, 625, 647, 650, International Studies 601, 602

III. Politics: 627, 628, 629, 633, 634, 635 (625, 650)

IV. Administration: 605, 606, 615, 720, 730, 731

V. Public Law: 616 and 611, or 615

NOTE I. In the above lists the courses included in the parentheses shall be considered desirable but not required of each candidate who is specializing in that field.

NOTE II. The minimum offering in each of the fields not selected for concentration should be as follows:

I. Theory: 621, 622, 623

II. International Law and Relations: 612, 613

III. Politics: 633, 634, 635

IV. Administration: 605, 606, 720, 730, 731

V. Public Law: 616 and 611, or 615

B. It is recommended that persons who are specializing in any field normally be required to complete all of the courses listed in that field.

C. At the preliminary examination the candidate should present himself for written and oral examination in the four fields other than his field of concentration.

D. The examination will cover a field as a whole rather than particular courses although a detailed examination will not be given in those optional portions of a field in which the candidate has had no ccurse work.

E. Considerable flexibility will be permitted in arranging programs and encouragement should be given to the practice of including courses in other departments as a part of the preparation of the Ph.D. candidate with groups of courses in other departments, such as history and economics. This may be recognized as a fifth field to be presented at the time of the preliminary examination.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION." page 46.

Majors in economics, education, geography, history, philosophy, social administration, and sociology, may be admitted to these courses without the political science prerequisites, by special permission of this department.

605. Principles of Public Administration I. Five credit hours. Autumn Quarter. General prerequisites must include ten hours in political science. Mr. Walker.

A consideration of the general problems of public administration; principles of governmental and administrative organization; control over administration; the civil service; personnel administration; budgets and accounting; centralized purchasing; public reporting and other staff functions.

606. Principles of Public Administration II. Five credit hours. Winter Quarter. Four lecture and discussion sessions and one field interview each week. General prerequisites must include fifteen hours in political science. Mr. Walker.

The laboratory for courses in public administration lies in the offices and institutions of government. The field work in this course will require personal interviews with public officers and weekly papers based upon them. This portion of the course will require two to five hours per week.

611. Introduction to Jurisprudence. Five credit hours. Autumn Quarter. Mr. Spencer.

An introductory study of legal concepts. An attempt is made both to give the prospective law student an analytical and historical guide into his subject, and to give those who do not intend to pursue the study of law an idea of its significance in social organization, and its relation to political and economic science.

612. International Law. Three credit hours. Winter Quarter. Mr. Spencer.

A study of the principles of international law in their growth and present status, with particular attention to unsettled points, and problems raised by the World War and recent developments.

613. Contemporary International Politics. Five credit hours. One Quarter. Autumn and Spring. Mr. Spencer, Mr. Helms.

Methods and ideals of diplomacy; current problems in international relations, such as the reorganization of Europe, Pan-Americanism, and the Far East; tendencies toward administrative, judicial, and legislative world-organization.

615. Administration of Justice. Three credit hours. Spring Quarter. General prerequisites must include ten hours in political science. Mr. Aumann.

A study of the nature, purposes, and limitations of law as administered through courts. The development, organization, and procedure of our judicial system. Recent trends in legal thinking.

616. American Constitutional Law. Five credit hours. Winter Quarter. General prerequisites must include ten hours in political science. Mr. Aumann.

A study of leading constitutional principles in the United States as interpreted by the courts. Special studies will be made of such topics as the following: the adoption and amendment of constitutions; the judicial power; citizenship; private rights; the powers of Congress; war powers; police power of the states; political privileges. Designed for students who desire a non-technical knowledge of the more important federal and state constitutional principles in the United States.

621. Ancient and Medieval Political Thought. Three credit hours. Autumn Quarter. Mr. Spencer.

The chief theories of European government from the time of Plato to the opening of the modern period. Political Science 621, 622, and 623 are intended to present consecutively the development of European political philosophy.

622. Modern Political Thought. Three credit hours. Winter Quarter. Mr. Spencer.

The chief theories of European and American government from the sixteenth century to the middle of the nineteenth century. This course is naturally preceded by Political Science 621, though the latter is not required, and is naturally followed by Political Science 623.

623. Contemporary Political Thought. Three credit hours. Spring Quarter. Mr. Spencer, Mr. Heimberger.

An examination of the more important contemporary trends of political thought and of the theoretical problems of the nature of the state, of government, and of law.

625. Great Britain and the British Commonwealth. Five credit hours. Spring Quarter. Mr. Heimberger.

An advanced study of the government of Great Britain with emphasis upon political parties, Parliament and the Cabinet. A critical examination of the British Empire, including India, the crown colonies and the protectorates. The British Commonwealth as an association of self-governing states, with individual attention to Canada and the other dominions. The special problem of Eire.

627. Latin American Government and Politics. Five credit hours. Spring Quarter. Mr. Spencer.

A study of the political conditions and practices of the states of South and Central America. The results on state organization and operation of the special geographical and historical conditions of this region, as regards written constitutions, representative institutions, and the developing administrative hierarchies. The influence of the United States, and tendencies for and against interaction among the states of the hemisphere.

628. New European Governments. Three credit hours. Autumn Quarter. Mr. Spencer.

The states of Continental Europe as affected by the crises of revolution and war, of post-war reconstruction. Special attention given to Russia, France, Italy and Germany. Problems of monarchic versus presidential leadership, of parliamentary representation and parties, of local autonomy and the rights of the individual.

629. Soviet Union in World Affairs. Three credit hours. Winter Quarter. General prerequisites must include Political Science 402. Mr. Ballis.

An intensive study of the Soviet Union from the standpoint of its internal organization and the role which it plays in world affairs. The form and operation of the Soviet state, Soviet socialism and the comintern, the problems of world relations and the emergence of the USSR as a world power, problem of USSR and U. S. relations.

633. Legislation. Three credit hours. Spring Quarter. General prerequisites must include ten hours in political science. Mr. Walker.

The process of law making in the United States, the constituent process, statute law making, legislative drafting, legislative procedure, judicial review, the common law, executive ordinances, popular law making.

634. Public Opinion and Political Processes. Five credit hours. Autumn Quarter. General prerequisites must include ten hours in political science. Mr. Foster.

Nature and measurement of public opinion and its effect on political processes; genesis of political attitudes; propaganda of pressure groups; government propaganda in peace and war; political influence of social institutions, including press, radio, and movies. Lectures, discussion, and report.

635. American Political Parties and Pressure Groups. Five credit hours. Winter Quarter. General prerequisites must include ten hours in political science. Mr. Helms, Mr. Kesselman.

An analysis of the organization, programs and campaign methods of political parties and of such pressure groups as labor, business, agriculture, etc. Methods of nomination, suffrage qualifications, campaign finance, government regulation of parties and pressure groups and the conduct of elections.

647. Problems of Western Pacific. Three credit hours. Spring Quarter. General prerequisites must include Political Science 402. Mr. Ballis.

A study of the outstanding contemporary problems in the Pacific area, especially Soviet Asia, Japan, China, Southeastern Asia and the antipodes. Military and naval aspects of the Pacific; post-war political, social and economic resettlement. Clash of races and cultures. Pacific organization.

649. International Relations of the Far East. Five credit hours. Autumn Quarter. Mr. Ballis.

Early impact of the Occident upon the Far East; relations between Russia, Japan and China; opening of the Far East in the Nineteenth Century; period of wars and unsettlement; international rivalries in China. The Open Door Policy; the Russo-Japanese War; the Chinese Revolution; the effects of World War I and the Russian Revolution; Japanese imperialism. World War II and its aftermath.

650. The Governments and Politics of the Far East. Five credit hours. Winter Quarter. Mr. Ballis.

The imperial system of China and the experiment with the Republic; constitutionalism vs. militarism in Japan; the contiguous governments of eastern Asia: Korea, Manchukuo, Siberia, and Mongolia.

701. Minor Problems. Three to five credit hours. Autumn, Winter, and Spring Quarters. Informal conferences, the intent being to allow full scope to the initiative of the student. General prerequisites must include forty hours of credit in the social sciences including fifteen hours in political science. Department staff.

A special topic is assigned to each student and results are tested by theses and special examinations.

714. International Administration. Three credit hours. Spring Quarter. One two-hour class meeting each week. Mr. Foster.

A study of the administrative aspects of the process of international cooperation; unions; governing commissions; courts; the sections and technical organization of the League of Nations; International Labor Organization.

Not open to students who have credit for Political Science 814.

720. Comparative Public Administration. Three to five credit hours. One Quarter. Autumn, Winter, Spring. General prerequisites must include 605 and 613, or equivalent. Mr. Walker.

An examination of the organization and functioning of administrative agencies abroad as compared with those in the United States. Seminar discussions supplemented by written reports on assigned topics. A reading knowledge of the language of the country selected for study is desirable.

730. Administrative Law. Three credit hours. Autumn Quarter. Mr. Strong.

A study of the creation and powers of administrative tribunals, the limits upon administration discretion, the procedure before administrative tribunals, and the methods and scope of judicial relief from administrative action.

Casebook to be announced.

(Identical with Administrative Law in the College of Law.)

731. Methods of Governmental Research. Three credit hours. Spring Quarter. Given in alternate years. General prerequisites must include fifteen hours of political science. Mr. Walker.

The materials of political science; history of procedure in political science research; research technique; presentation of results of research.

Not open to students who have credit for Political Science 631.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

These prerequisites include a foundation laid in college courses in the historical and social sciences.

805. Political Thought. Three to five credit hours. Autumn, Winter, and Spring Quarters. Mr. Spencer.

Research in the history of political ideas and in the theoretical problems of contemporary politics.

806. Comparative Government. Three to five credit hours. Autumn, Winter, and Spring Quarters. Mr. Spencer.

Research in the governments of foreign countries.

807. Public Opinion and Political Parties. Three to five credit hours. Autumn, Winter, and Spring Quarters. Mr. Helms, Mr. Foster.

A systematic study of the informal phases of politics. Special attention will be given to individual projects dealing with pressure groups, political party organization and procedure, and other aspects of the governmental process.

808. Public Administration. Three to five credit hours. Autumn, Winter, and Spring Quarters. Mr. Walker.

Research in staff and line activities of national, state, and local government.

809. Municipal Government. Three to five credit hours. Autumn, Winter, and Spring Quarters. Mr. Helms.

Reading and research in the municipal governments of the United States and Europe.

810. International Relations. Three to five credit hours. Autumn, Winter, and Spring Quarters. Mr. Spencer, Mr. Helms.

Research in international relations.

811. Public Law. Three to five credit hours. Autumn, Winter, and Spring Quarters. Mr. Aumann.

Readings and research in the field of public law including selected problems in the fields of constitutional law or judicial administration.

812. Legislation. Three to five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Walker.

Research in the legislative process as exemplified by Congress, the state legislatures and city councils.

815. Bases of Conflicts in the Contemporary Far East. Three to five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Ballis.

Investigations of the psychological, social, economic and political bases of conflicts between Japan, China and the Soviet Union.

950. Research in Political Science. Autumn, Winter, and Spring Quarters. General prerequisites must include six Quarter-courses in political science.

This course presents an opportunity for advanced research in political science, in such portion of the field as may be agreed upon with the individual student. It is offered in every Quarter, and with any of the members of the department in residence.

POULTRY HUSBANDRY

Poultry Administration Building

PROFESSORS DAKAN AND WINTER

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

601. Poultry Nutrition. Three credit hours. Autumn Quarter. One lecture and two two-hour laboratory periods each week. Mr. Winter.

Experimental techniques for determining the nutritive requirements of poultry. Biological analysis of feedstuffs for poultry.

603. Marketing Poultry Products. Three credit hours. Autumn Quarter. Three recitations each week. General prerequisites must include ten hours of economics, Rural Economics 613, or Business Organization 700. Mr. Dakan.

Market movements of poultry and eggs, marketing agencies, including poultry cooperatives, trends in refrigeration and preservation of poultry and eggs, and imports and exports of poultry products.

606. Poultry Genetics. Three credit hours. Winter Quarter. Three lecture-conference periods each week. General prerequisites must include a course in heredity. Mr. Dakan.

Inheritance of viability, egg production, and other characters of economic importance, breeding records, and progeny testing.

610. Hatchery Management. Three credit hours. Spring Quarter. Three lecture-conference periods each week. General prerequisites must include ten hours of economics. Mr. Dakan.

Egg supply, hatchery records and accounts, and the sale of chicks.

615. Poultry Management. Five credit hours. Spring Quarter. Five lecture-conference periods each week. General prerequisites must include ten hours of economics. Mr. Dakan.

Economic and management factors involved in the operation of specialized poultry breeding, egg, and meat plants.

701. Special Problems in Poultry Husbandry. Three to fifteen credit hours, taken in units of three to five hours each Quarter for one or more Quarters. Autumn, Winter, Spring. Mr. Dakan, Mr. Winter.

Limited to advanced students and must be arranged with the instructor in charge. Each student will be required to make an exhaustive study of some particular phase of poultry husbandry and write a thesis of his study and research. The work must comprise in part some original investigation by the student.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

950. Research in Poultry Husbandry. Autumn, Winter, and Spring Quarters. Library, conference, and laboratory work. General prerequisites must include acceptable courses in the chosen field of research. The student may spend a part or all of his time on research work. Mr. Dakan, Mr. Winter.

Research may be done in genetics, embryology, metabolism, and nutritional diseases.

PRACTICAL ARTS AND VOCATIONAL EDUCATION

(See Education)

PRINCIPLES AND PRACTICE OF EDUCATION

(See Education)

PSYCHOLOGY
Office, 325 Arps Hall

PROFESSORS BURTT, PRESSEY, TOOPS, DOCKERAY, RENSHAW, ENGLISH, WILLIAMS, SHARTLE, ROBINSON, LOUTTIT, EDGERTON AND DUREA, ASSOCIATE PROFESSORS ROGERS AND STOGDILL, ASSISTANT PROFESSORS HORROCKS, KINZER AND ROTTER

The department offers instructional and training facilities in practically all divisions of psychology. For administrative purposes and general guidance of the student, these may be grouped into a number of areas mentioned below, but there is considerable flexibility in the working out of a unified program of study. This should be done in consultation with the adviser as early in the graduate program as possible. A student pursuing work beyond the Master's degree will have an advisory committee of three members which works closely with the student in planning his program. This committee reports annually to the Chairman of the Department as to the student's program and also certifies to the standing committee on examinations when they believe the student is ready for the general examinations and the fields in which he is to be examined.

Students seeking admission to graduate work in the Department of Psychology who have had less than twenty Quarter hours credit in psychology must have the admission approved by the chairman of the department and the proposed major adviser.

For purposes of the general comprehensive examination required for candidates for the doctorate, the work of the department may be considered under six areas or fields of specialization:

1. General Psychology (including theoretical, experimental and comparative)
2. Educational Psychology (including mental and educational tests)
3. Clinical and Abnormal Psychology
4. Statistics
5. Industrial Psychology
6. Personnel (student)

The first portion of the general examination for admission to candidacy is administered by a standing committee of the department. In addition to the foregoing areas of the department, a seventh possibility is an examination in a related field outside the department. The candidate, subject to the approval of his advisory committee, selects four of these seven areas on which to be examined and one of these areas must be number 1 (supra) General Psychology. These four examinations will be written. If successful, the candidate then has a written examination of his field of specialization and the oral examination.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

601. Experimental Psychology. Three to five credit hours. Autumn Quarter. One lecture and two or more laboratory periods each week. Mr. Renshaw.

The laboratory training course in experimental psychology for advanced undergraduates and graduate students. The experiments are selected both for general cultural value and for preparation for technical research in experimental psychology.

Psychology 601, 602, 603 comprise a unit year's work. Students may enter any Quarter.

602. Experimental Psychology. Three to five credit hours. Winter Quarter. One lecture and two or more laboratory periods each week. Mr. Renshaw.

603. Experimental Psychology. Three to five credit hours. Spring Quarter. One lecture and two or more laboratory periods each week. Mr. Renshaw.

605. Physiological Psychology. Three credit hours. Autumn Quarter. Three lectures each week. Mr. Dockeray.

A study of the physiological basis of psychological phenomena. The sensory processes, set, learning and inhibition will be special topics for treatment. Psychosomatic abnormalities will be considered.

606. Advanced Physiological Psychology. Three credit hours. Winter Quarter. Three lectures each week. General prerequisites must include Psychology 605 or permission of the instructor must be obtained. Mr. Dockeray.

The physiological processes involved in attention, emotion, fatigue and sleep. Recent studies of muscle potentials and brain waves as they relate to psychological problems will be emphasized.

607. Genetic Psychology. Five credit hours. Spring Quarter. Five lecture hours each week. Lectures, recitations, and reports.

This course is designed to present the facts of mental development and their significance. Topics considered are: individual development, particularly with reference to the development of the nervous system; inheritance of mental traits; innate tendencies, their characteristics, description, and modification; play; mental states, their physiological basis and development with growth and training; moral and religious development; physical development.

608. Educational Statistics: Elementary. Four credit hours. Autumn Quarter. Two lectures and two two-hour laboratory periods each week. Mr. Toops.

A basic statistical course for students intending to conduct major or minor research. Frequency distributions, measures of central tendency and variability; construction of graphs and charts; interpretation of results in terms of probability; simple treatment of correlation. Extended practice in the use of calculating machines and computational devices.

609. Exceptional Children: General Survey. Three credit hours. One Quarter. Autumn and Spring. Three lecture hours each week. Lectures, reports, clinics, and visits to public institutions. General prerequisites must include ten hours of psychology. Mr. Louttit.

The social and pedagogical significance of individual differences among children with respect to mental, physical, and social traits and their interrelations. Superior and subnormal children, those with special abilities and disabilities, the blind, the deaf and hard of hearing, the defective in speech, and those who present personality and behavior problems.

611. Mentally Deficient Children. Three credit hours. Winter Quarter. Three lecture hours each week. Lectures, reports, clinics, and visits to public institutions. General prerequisites must include thirteen hours of psychology. If this does not include Psychology 609, permission of the instructor must be obtained.

The varieties and grades of mental deficiency, including the backward child of the schools and the distinctly feeble-minded. Consideration of mental deficiency and defect for purposes of educational treatment and social adjustment. The psychology of feeble-mindedness; types, degrees, causes, and consequences.

613. Mental and Educational Tests. Three credit hours. Winter Quarter. Two lectures and one conference and laboratory hour each week. Lectures, readings, classroom demonstrations, and special reports. Mr. Pressey.

A broad basic course for teaching and for students of psychology, clinical work, and sociology. The course will begin with a discussion of tests in school subjects, will then take up tests of general and special ability and "non-intellectual" traits, and will conclude with a general discussion of the construction of tests and their use in dealing with various practical and research problems.

615. Psycho-Educational Diagnosis and Treatment. Three credit hours. May be taken for one to three Quarters with a maximum credit of nine hours. All Quarters. One lecture and four laboratory hours each week. General prerequisites must include Psychology 683 and permission of the instructor must be obtained. Mr. Robinson, Miss Rosebrook.

Practice in the giving and scoring of tests. Clinical use of test materials in the diagnosis of special disabilities and difficulties in school work; clinical practice with remedial procedures.

618. Clinical Tests. Four credit hours. One Quarter. Autumn, Winter, Spring. Two laboratory periods each week. Laboratory demonstrations and individual testing. General prerequisites must include fifteen hours of psychology or ten hours of psychology and five hours of professional educational subjects or sociology. (It is recommended that Psychology 695 be included in these requirements.) Mr. Louttit, Mr. Durea.

Study and practice with individual mental tests as used in psychological clinics. To include Binet, performance, and personality tests.

619. Psychological Clinic. Two or four credit hours. One Quarter. Autumn, Winter, Spring. One four-hour laboratory period each week. Clinic practicum. May be taken for one or two Quarters with a maximum credit of

four hours. General prerequisites must include Psychology 618. Mr. Durea, Mr. Louttit, Mr. Rotter.

Practical work in the examination and study of psychological problems. Cases will be studied in schools, institutions and in the psychological clinic.

NOTE: Because of demand for psychological service by parents, schools and a variety of social and welfare agencies the psychological clinic operates throughout the year. A student may profitably receive the special training which this course gives for a Quarter. Repetition does not involve repetition of content but additional practice in clinical procedure.

622. Delinquent Children. Three credit hours. Spring Quarter. Three lecture hours each week. Lectures, reports, and visits to the Bureau of Juvenile Research. General prerequisites must include thirteen hours of psychology. If this does not include Psychology 609, permission of the instructor must be obtained. Mr. Durea.

The meaning and significance of delinquency; its psychological basis; causes and prevention; the home and school as factors determining delinquent behavior; the significance of psychological findings for juvenile court procedure; present-day methods of dealing with the problem. The psychology of social conformity versus non-conformity; i.e. misconduct, whether technically delinquent or not.

624. Psychology of Vision and Hearing. Five credit hours. Spring Quarter. Five lectures each week.

Production, measurement and control of photic stimuli and measurements of the variations in their effectiveness as determined by physical and physiological factors. The work will consist in part of lecture-demonstrations and experiments and in part of a critical study of the reports of original authors. Special attention will be given to the facts and hypotheses of color-vision and to visual problems in industry.

626. Learning and Thinking. Five credit hours. Winter Quarter. Five lecture and discussion hours each week. Mr. Renshaw.

The development of the principles which underlie the acquired modifications of human behavior.

628. Principles and Economy of Learning. Three credit hours. Winter Quarter. Three lectures each week. Lectures, readings in monographs and journals, discussions. General prerequisites must include permission of the instructor and sixteen hours of psychology or graduate standing. Mr. English.

The control of learning activities; memory and forgetting; transfer of training; generalization and thinking in relation to memory; the more elaborate types of learning such as are seen in school work. Special attention will be paid to recent experimentation and theories.

629. Advanced Psychology. Five credit hours. Autumn Quarter. Five lectures each week. Miss Rogers.

The purpose of this course is to give a larger background to the advanced student of psychology, with respect to other disciplines, especially the sciences, leading to a systematic development of the more complex experiences.

630. Psychology of Feeling and Emotion. Five credit hours. Spring Quarter. Five lectures each week. Miss Rogers.

A study of the various theories of feeling and emotion and the fundamental relations of emotion to other experiences, personality and adjustments. Emotions in relation to various physiological activities. Methods of investigating emotion.

631. Nature and Appraisal of Individual Differences. Three credit hours. Spring Quarter. Three lecture hours each week. Mr. English.

Critical consideration of common ideas about ability and other traits. Historical development of measurement of individual differences. Resulting theories of intelligence, special abilities, and other traits. Relation of measurement of individual differences to systematic psychology.

634. Criminal and Legal Psychology. Three credit hours. Winter Quarter. Three lectures each week. Mr. Burtt.

Psychological factors in the determination of reliability of testimony; the technique of detecting crime and falsehood; responsibility; the relation of crime to mental disease or defect; the prevention of crime through environmental factors and heredity.

635. Psychology of Advertising. Three credit hours. One Quarter. Autumn and Spring. Three lectures each week. Mr. Burtt, Mr. Baker.

The psychological principles involved in effective advertising, notably attention, memory and action, with the contributory factors of association, feeling, instinct, suggestion, and reasoning.

637. Industrial Psychology. Three credit hours. Autumn Quarter. Three lectures each week. Mr. Burtt.

The application of psychology to problems of industrial learning, adjustment of technical to mental factors, monotony, fatigue, environmental conditions, industrial unrest, morale, and accidents

638. Industrial and Vocational Psychology Laboratory. Three credit hours. Spring Quarter. Two three-hour laboratory periods each week. In addition to the general prerequisites the permission of the instructor must be obtained. Mr. Burtt.

Laboratory work in the application of psychology to industrial and vocational problems, with especial emphasis on the development of psychological techniques for hiring employees. Practice in the devising and standardizing of occupational tests; obtaining and evaluating production ratings; correlation of ratings and tests; interpretation of results from the standpoint of vocational selection or guidance.

639. Psychology and Personnel. Three credit hours. Winter Quarter. Three lectures each week. Mr. Burtt.

The application of psychology to problems of personnel. Selection and placement of employees by tests of intelligence and special ability. Trade tests, job analysis, and rating scales.

640. Educational and Vocational Guidance. Three credit hours. Winter Quarter. Mr. Toops.

A course dealing with the technique of evaluating psychological and related factors as a basis for making educational and vocational recommendations to individuals. The place of vocational and educational tests, previous record, and personality traits in determination of choice of occupation or course of study.

641. Abnormal Psychology. Five credit hours. Winter Quarter. Four lectures each week. Lectures and reports. Mr. Durea.

An orientation in the problem of abnormal behavior from a clinical and experimental point of view. Discussion of syndromes exhibited in various types of abnormality of both major and minor degrees. Functional disorders stressed. Implications of abnormal behavior for normal conduct. Clinics and demonstrations at the Columbus State Hospital.

642. Psychopathology. Three credit hours. Spring Quarter. Two lectures each week. Lectures and reports. Mr. Durea.

This course will deal with the unusual manifestations of behavior and its dynamics. Consideration of subconscious phenomena in phobias, suggestion, the psychological aspects of hysteria, and multiple personality, psychasthenia, neurasthenia, and other disorders of personality.

644. The Techniques of Human Motivation. Three credit hours. Spring Quarter. Three hours each week. Lectures, recitations, and assigned readings. Mr. Toops.

The psychological bases of initiation and improvement of work. The role of instinct, habit, custom, and tradition, rationalization and psychopathy in motivation. The incentive values of self-ratings, competition, punishment, and such rewards as money, bonuses, participation, and promotion, in relation to the capacities of individuals.

645. History of Psychology. Three credit hours. Autumn Quarter. Five lectures each week. General prerequisites must include sixteen hours in psychology.

The course aims to view modern psychological problems in the light of their historical antecedents. The development of various theories such as those of sensation, attention, space perception, and emotion will be traced from earliest times to the present. As far as possible assignments will involve reference to original sources.

646. Contemporary Viewpoints in Psychology. Three credit hours. Spring Quarter. Three lectures each week. General prerequisites must include fifteen hours in psychology. Mr. Dockeray.

A consideration of the contributions of various schools beginning with structuralists, functionalists, and behaviorists. Special attention will be given to the points of view of leading

psychologists of the present. Such concepts as Gestalt, topology and operational definitions will be especially considered.

647. Theoretical Psychology. Three credit hours. Winter Quarter. Three lectures each week. General prerequisites must include sixteen hours in psychology. Mr. Dockeray.

An attempt at an organization of the data of psychology into a consistent system. Students will be given an opportunity to express their preferences in the development of their own systematic points of view.

650. Minor Problems. One or more credit hours. Autumn, Winter, and Spring Quarters. General prerequisites must include sixteen hours in psychology and the permission of the instructor must be obtained. All instructors.

Investigation of minor problems in the various fields of psychology.

By permission of the Chairman of the Department and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under the auspices of the Bureau staff.

***655. Comparative Psychology.** Five credit hours. Autumn Quarter. Five lectures each week. Mr. Dockeray.

The principles of animal behavior in relation to human behavior. A study of the similarities and differences in the behavior of animals and of humans and the explanation of these similarities and differences, with special reference to those principles definitely involved in the organism's mode of adjusting to its environment.

***656. Comparative Psychology.** Three credit hours. Spring Quarter. Three lectures each week. General prerequisites must include Psychology 655. Mr. Dockeray.

A continuation of Psychology 655. Devoted largely to contemporary literature in comparative psychology.

659. University Personnel Psychology. Three credit hours. Autumn Quarter. Two lectures and one two-hour laboratory period each week. Given in alternate years. Mr. Toops.

A course designed for students who are preparing for positions in vocational guidance or personnel work in universities and those interested in the achievement of adults. The giving, scoring and interpretation of tests of university entrants. Reading tests and tests of special capacities for adults. Planning a testing program for adults. Theories of adult testing. Comparative study of University personnel programs and procedures. The content of the course will vary somewhat from year to year.

663. Child Psychology. Four credit hours. Autumn Quarter. Four class meetings each week. Cannot be counted as professional work unless Psychology 664 is also taken. Mr. English, Mr. Pressey.

The psychological development of the child from three to twelve years. Effects of the school and out-of-school activities on development. Analysis of significant psychological problems involved in curricular activities. Provision by school and other social agencies for the psychological needs of the child.

664. Observation of the Elementary School Child. One or two credit hours. One credit hour for Graduate students. One Quarter. Autumn, Winter, Spring. General prerequisites must include Psychology 663. If taken any other Quarter than the one following that in which Psychology 663 is taken, special permission of the instructor must be obtained in advance. Mr. English, Mr. Pressey, Mr. Robinson.

Observation of a particular individual child at least one hour weekly over a twenty-week period. Preparation of a detailed report of observations, together with an evaluation of test results, school records, physical and mental examination and case-history records of this individual.

NOTE: The observations should normally begin about the middle of the Quarter during which Psychology 663 is being taken and be continued to the end of the following Quarter. Only in highly special cases can the observations be condensed into less than twenty weeks as the essential objective is a long-continued acquaintance with a developing child.

* Not given in 1946-1947.

665. The Psychology of Character Formation. Three credit hours. Spring Quarter. Three meetings each week.

Psychological analyses of character, in which are brought out the relation of character to its biological bases and its distinction from personality. Major attention is given to recent experimental studies of morale and of attitudes as factors in character, of the measurement of character and of the effect of varying environment influences on character.

667. Psychology of Music. Three credit hours. Winter Quarter. General prerequisites must include a course in educational psychology and a course in advanced harmony or consent of the instructor must be obtained. Mr. M. E. Wilson.

The contribution of rhythm, harmony, tone color, form, familiarity, voice and tactual association to the emotional experience in music. Analysis and measurement of musical talent. Psychological factors in musical interpretation and in the teaching of music.

668. Principles of Gestalt Psychology. Three credit hours. Autumn Quarter. Three lectures each week.

A survey of the experimental work which supplied the data for the Gestaltist. A study of the basic dynamic principles which constitute the Gestalt system. Application of these principles to perception, learning, thinking, and emotion.

669. Gifted Children. Three credit hours. Winter Quarter. Lectures, readings, and reports. General prerequisites must include thirteen hours of psychology. If this does not include Psychology 609, permission of the instructor must be obtained.

A study of the nature, development, and education of the gifted child with special reference to those psychological traits that distinguished him from the typical child.

670. Psychological Problems of Adult Life. Three credit hours. Spring Quarter. Mr. Pressey.

A survey of the important recent psychological literature on changes in capacity for learning through the adult years and into old age, changes in incentives and interests throughout these years, emotional development and orientation of adults, psychological problems of work adjustment, adult and parent education, leisure.

Not open to students who have credit for Psychology 825.

671. Principles of Treating the Problem Child. Three credit hours. One Quarter. Winter Quarter. Three lecture hours each week with lectures, recitations and reports. General prerequisites must include thirteen hours of psychology. If this does not include Psychology 609, permission of the instructor must be obtained. Mr. Rotter.

For prospective teachers, counselors and clinicians. A survey of treatment procedures and resources. Methods used in dealing with behavior and personality problems. The flexible use of school environment and community resources, methods of altering attitudes of parent and child, and direct treatment approaches.

672. Psychological Aspects of Biography. Three credit hours. Autumn Quarter. One two-hour meeting and one conference hour each week. Prerequisite, Psychology 402 or 407. Mr. Pressey.

The course will make use of the very rich biographical and autobiographical material now available in an effort to understand development trends throughout the life-span and with special reference to the adult years and older ages.

674. Problems of the Dean of Women. One or more credit hours. Autumn, Winter and Spring Quarters. Mrs. Conaway.

Investigation of the minor psychological problems which arise in connection with the social, scholastic, and vocational adjustments of undergraduate women.

***676. Advanced Educational Psychology.** Three credit hours. Winter Quarter. Three lectures each week.

A course in advanced educational psychology giving a critical appraisal of the implications for education of modern psychological findings.

* Not given in 1946-1947.

678. Psychology of Personality. Three credit hours. Spring Quarter. Three lectures each week. Mr. Durea.

This course will consider the individual both as a social and biological unit, relating each group of factors to the development of personality. Ample attention will be given to questions such as integration, measurement of traits, personality types, faulty schemes of character analysis; effect of glands of internal secretion; self-analysis. The course is correlative to Psychology 641.

679. Psychology of Public Attitudes. Three credit hours. Autumn Quarter. Three lectures each week. Prerequisite, Psychology 402. Mr. Baker.

The influence of imitation, suggestion, transfer of emotions, postural set, and defense mechanisms on public attitudes. Psychological factors in leadership and morale. Special emphasis on the experimental approach and such techniques as scaling attitudes and factor analysis.

680. Educational Tests and Measurements. Three credit hours. Spring Quarter. Three lectures each week. Assigned readings and reports. Open to seniors and graduate students of experience with permission of the instructor in charge. Mr. Heck, Mr. Pressey.

A service course for those majoring in Elementary and Secondary Education and School Administration. The course will consider selection of tests and organization of testing programs for elementary and secondary schools; the use of tests in classification, diagnosis, prognosis, and educational guidance; the principles of teacher-made tests; and effect of testing on marking systems.

681. Psychology of Remedial Counseling. Three to five credit hours; this course may be repeated until ten hours have been earned. One Quarter. Autumn, Winter, Spring. Two lectures and three to five laboratory hours each week. General prerequisites must include thirteen hours of psychology and permission of the instructor must be obtained. Enrollment is limited by extent of laboratory facilities. Mr. Robinson.

Psychological principles involved in aiding students in high school and college in their adjustment to curricular and extra-curricular activities. This includes methods of psycho-educational diagnosis, principles of effective learning and remedial reading instruction. Laboratory practice is obtained by assisting beginning college students with such problems.

NOTE: It is suggested that students may find considerable profit in repeating the course. Such repetition represents additional experience and meeting a greater variety of problems.

683. Psychology of Reading. Three credit hours. Spring Quarter. Three lecture and discussion hours each week. Mr. Robinson.

Psychological analysis of the reading process. The relationship of this to teaching and remedial methods. Discussion of remedial reading techniques.

685. Educational and Vocational Guidance Laboratory. Three to five credit hours; this course may be repeated until ten hours have been earned. One Quarter. Autumn, Winter, Spring. One two-hour lecture, discussion and demonstration period and three to six hours of practical experience each week in counseling and related activities. Permission of the instructor must be obtained. General prerequisites must include Psychology 689. Mr. Edgerton.

An opportunity for mature students who have adequate background to obtain practical experience in guidance and counseling. Practice in counseling with both in-school and out-of-school youth, with parents, employers, and social agencies. At present the counseling is done through the facilities of the Occupational Opportunity Services. It may also use the facilities of the U. S. Employment Service.

NOTE: It is suggested that students may find considerable profit in repeating the course. Such repetition represents additional experience and meeting a greater variety of problems.

688. Laboratory in Employment Techniques. Four or five credit hours. One Quarter. Winter and Spring. Two lecture hours and four to six laboratory hours each week. General prerequisites must include Psychology 689. Mr. Shartle, Mr. Edgerton.

Employment interviewing and occupational classification, including use of Dictionary of Occupations; description and interpretation of work samples and psychological tests; actual supervised practice in employment interviewing, classification, placement employer calls, and administration of work samples and tests in the Ohio State Employment Service.

689. Occupational Information. Three credit hours. One Quarter. Autumn and Spring. Two two-hour meetings each week. Lectures, discussions, field trips. Mr. Shartle.

A survey of occupations and occupational information for guidance counselors and employment interviewers; study of the literature on occupations and occupational information; writing of occupational analyses; field trips to places of employment, to observe workers at work; finding filing and use of occupational information for employment and guidance purposes.

690. Mental Hygiene for Professional Workers. Three credit hours. Winter Quarter. Mr. Durea, Mrs. Stogdill.

This course is designed to provide an understanding of the individual and his adjustive behavior. Attention is given to the factors which influence behavior, the dynamics and motivation of behavior; the varieties of adjustive behavior. Consideration is given to the principles and methods of psychological readjustment and re-education. The illustrative material will be selected to be pertinent to the problems of teachers, personnel, and guidance workers, social workers, psychologists, occupational therapists, and other professional groups.

Not open to students who have credit for two or more of the following courses: Psychology 610, 663, 670, 678, 808.

693. Use of Tabulating Machine Techniques in Research. Two credit hours. Winter Quarter. One lecture and one laboratory period each week. General prerequisites must include Psychology 608, a course in statistics, or permission of the instructor. Mr. Toops.

Methods of large-scale researches involving tabulating machines and other specialized technical devices. Coding of data; operation of sorting and tabulating machines.

695. Clinical Psychology. Three credit hours. Autumn and Spring Quarters. Three lecture hours each week. General prerequisites must include ten hours of psychology. Mr. Louttit, Mr. Durea.

Discussion of the field of clinical psychology; its methods, its problems and its use in guidance, education, hospitals, industry, and other areas.

703. Special Topics in Psychology. Three credit hours. One Quarter. Autumn and Winter Quarters. Lectures and discussions. General prerequisites must include fifteen Quarter hours of Psychology courses in the "600" group or above and permission of the instructor. May not be elected more than twice. All instructors.

The topics will vary from Quarter to Quarter and will be announced at least one month in advance. The following are typical of the topics contemplated in the near future: factor analysis, technique of constructing personnel forms, techniques of the remedial interview, contribution of experimental neuroses to abnormal psychology, psychology of senility.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

These prerequisites include the equivalent of at least two years of psychology; or of one year of psychology and one year of college work in one of the following subjects: philosophy, mathematics, physiology, physics, zoology, sociology.

802. Seminar in Experimental Psychology. Two credit hours. Autumn, and Winter Quarters. Mr. Renshaw, Mr. Dockeray, Miss Rogers.

803. Seminar in Educational Psychology. Two credit hours. Autumn and Winter Quarters. Mr. Pressey, Mr. English.

805. Contemporary Psychological Literature. One credit hour. Autumn, Winter, and Spring Quarters. Mr. Renshaw.

806. Seminar in Clinical and Abnormal Psychology. Two credit hours. Autumn and Winter Quarters. Mr. Maxfield, Mr. Durea, Mrs. Stogdill, Mr. Louttit.

807. Seminar in Industrial Psychology. Two credit hours. Winter Quarter.

808. Psychodynamics. Three credit hours. Autumn Quarter. One two-hour period each week and one hour to be arranged. Mr. Durea.

Critical evaluation and interpretation of implications derived from the basic postulates of psycho-analysis, field theoretical approach, personalistic approach, and cultural factors. Reports and discussions of equal interest to graduate students in psychology, education, and social administration.

809. Projective Methods of Studying Personality. Two credit hours. Spring Quarter. Three lecture hours each week. Permission of the instructor must be obtained. Mr. Rotter.

General principles, evaluation and application of projective techniques including introduction to administration and scoring of some of the more widely used methods.

***810. Psychological Problems in Higher Education.** Two credit hours. Autumn Quarter. One meeting each week. Mr. Pressey.

A critical review of the research work thus far done on such problems as study methods, background information essential for college work, individual differences, placement tests, measurement of progress. The course is intended to give graduate students preparing for college or university positions contact with current educational research regarding the problems they will meet, and develop a research attitude toward these problems.

811. Advanced Theoretical Psychology. Three credit hours. Autumn Quarter. Three lectures each week. Mr. Dockeray.

814. Advanced Statistics. Four credit hours. Winter Quarter. Two lectures and two two-hour laboratory periods each week. General prerequisites must include a course in educational statistics or permission of the instructor. Mr. Toops.

Special cases in correlation; non-linear regression; construction of criteria; sampling; statistical machines; derivation of commonly used equations; critical readings; construction of tables and graphs to meet the research needs of individual students.

815. Seminar in Psychological Statistics. Two credit hours in each of two successive Quarters. Autumn and Winter Quarters. One two-hour discussion period each week. Mr. Toops, Mr. Edgerton.

Statistical background equivalent to the sequence Psychology 608, 814 is assumed. Critical discussion of problems in the forefront of statistical psychology.

816. Special Statistical Methods. Four credit hours. Spring Quarter. Two lectures and two two-hour laboratory periods each week. General prerequisites must include Psychology 608 and 814 or equivalent. Mr. Edgerton, Mr. Toops.

The statistics of aptitudes, mental growth and attainment. Item analysis, quantification of qualitative data and pertinent psycho-physical theorems. Construction of tables and graphs to meet the individual needs of advanced students of psychology and education.

817. Clinical Treatment. Two or four credit hours. One Quarter. Autumn, Winter, Spring. Assignments equivalent to four or eight laboratory hours each week. A practicum. May be taken for one or two Quarters with maximum credit of four hours. General prerequisites must include Psychology 620 or 820 prior or concurrent. Mr. Louttit, Mr. Rotter.

A clinic practicum for advanced students in clinical psychology. The student will carry out various types of treatment techniques including psychotherapy, with individual cases in the Psychological Clinic or elsewhere. In addition to the treatment of the individual, cooperation with schools and social agencies, conducting of case conferences, keeping treatment records, evaluation of results, will be a part of the practice.

820. Advanced Psychological Clinic. Two or four credit hours; may be taken for one or more Quarters with a maximum credit of ten hours. One Quarter. Autumn, Winter, Spring. Assignments equivalent to two laboratory periods each week. General prerequisites must include Psychology 619 or

* Not given in 1946-1947.

permission of the instructor must be obtained. (Students are advised to consult instructor before registering.) Mr. Durea, Mr. Louttit, Mr. Rotter.

This course is designed for students who qualify as having developed a mature clinical point of view. Students will engage in actual clinical service, under the supervision of the instructor. Cases will be studied in the Psychological Clinic and in the nearby public schools and institutions. Special training in the diagnosis of borderline, psychopathic and doubtful cases. Case studies involving psycho-educational or behavior problems. Follow-up work on cases previously studied in the clinic. Problems of educational and vocational guidance. Advanced training in the preparation of clinical reports. Students expecting to deal with problems of college personnel will be assigned to work in this field.

NOTE: A student may profitably receive the special training which this course gives for additional Quarters. Repetition does not involve repetition of content but additional practice in clinical procedure.

Not open to students who have credit for Psychology 620.

822. Seminar in Student Personnel Psychology. Two credit hours. Winter Quarter. Mr. Robinson.

826. **Practicum in the Use of Personality Adjustment Techniques.** Three to five credit hours. Autumn, Winter, and Spring Quarters. This course may be repeated until ten credit hours have been earned. Lectures, group discussions, demonstrations, individual conferences, practical experience in interviewing, case recording, and related activities. General prerequisites must include twenty hours of psychology including one of the following courses: Psychology 619-620, 661, 681-682, 685, and permission of the instructor. The enrollment is limited by the extent of laboratory facilities. Mrs. Stogdill.

An opportunity for mature students with adequate background and training to obtain practical experience, under guidance, in the use of personality adjustment techniques at the college level.

NOTE: It is suggested that students may find it profitable to repeat the course. Such repetition represents additional experience in meeting a greater variety of problem situations.

831. Advanced Experimental Laboratory. Three to fifteen credit hours. Autumn, Winter, and Spring Quarters. May be taken one, two or three Quarters with a maximum credit of fifteen hours. Laboratory and conferences. Admission only after consultation with the instructor. Mr. Renshaw.

Quantitative methods in sensory fields, advanced studies in perception, learning, and memory.

840. Theory of Human Development. Three credit hours. Spring Quarter. Three lectures each week. Mr. Dockeray, Mr. English.

A critical consideration of the published data and interpretations of research which throw light on problems of human development. The meaning of development, the methods of investigation, and the units of measurement will be emphasized.

850. Seminar in the Psychology of Maturity and Old Age. Two credit hours. Autumn Quarter. Mr. Pressey.

950. **Research in Psychology.** Autumn, Winter, and Spring Quarters. All instructors.

Primarily intended for students offering theses for advanced degrees.

By permission of the Chairman of the Department and the Director of the Bureau of Educational Research, students enrolled in this course may obtain credit for research work done under the auspices of the Bureau staff.

PUBLIC ADMINISTRATION

It is the object of this course to prepare students for responsible posts in government service, particularly in administrative work. Public personnel administration, budget administration, public reporting, taxation and public finance, legislative drafting, governmental research, governmental accounting, and other fields not included in other professional curricula of the University, all offer opportunities for a career. The student who secures both a broad foundation and a grasp of technique is in demand both by government and by private research agencies. A broad foundation is offered by the undergraduate curriculum in public administration in the College of Commerce and Administration or its equivalent. The detailed requirements

of this undergraduate curriculum and of the graduate curriculum which follows are subject to modification to meet the needs of individual students. Students who have not met these requirements of a broad background in the fields of government and economics may find it necessary to spend a somewhat longer time on their graduate work in order to complete the work for the degree.

REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN PUBLIC ADMINISTRATION

To receive this degree, students must be in residence at The Ohio State University for at least three Quarters and an additional Quarter must be devoted to field work with some governmental or research agency approved by the adviser. A report upon such field work must be filed with the adviser and approved by him. Organizations with which field work may be done include: federal government agencies, the State of Ohio, the principal cities of the state, the important counties of Ohio, public and private governmental research, and numerous other organizations of local or state-wide scope. Candidates for the degree of Master of Science in Public Administration must also meet the same requirements in regard to a thesis and final examination as are prescribed for the degrees of Master of Arts and Master of Science.

CURRICULUM IN PUBLIC ADMINISTRATION

GENERAL REQUIRED COURSES

Autumn Quarter		Winter Quarter		Spring Quarter	
Political Science (950) Research in Political Science	3-5	Political Science (950) Research in Political Science	3-5	Political Science (950) Research in Political Science	3-5
Political Science (808) Research in Public Administration	3-5	Political Science (809) Research in Municipal Government	3-5	Political Science (807) Public Opinion and Political Parties	3-5

PUBLIC PERSONNEL ADMINISTRATION (OPTIONAL)

Psychology (637) Industrial Psychology	3	Psychology (618) Mental and Educational Tests	3	Psychology (618) Clinical Tests	2
Business Organization (680) Industrial Organization and Management	5	Psychology (639) Psychology and Personnel	3	Business Organization (686) Personnel Organization and Management	3
Psychology (616) Individual Testing	2	Psychology (634) Criminal and Legal Psychology	3	Business Organization (691) Office Organization and Management	3
		Industrial Engineering (601) Management of Men in Engineering Industries	4		

BUDGETING AND PUBLIC FINANCE (OPTIONAL)

Economics (631) Public Finance	3	Economics (632) Public Finance	3	Economics (633) Public Finance	3
Economics (710) Statistical Analysis	2	Economics (711) Statistical Analysis	2	Economics (639) Social Insurance	3
Accounting (603) Cost Accounting	5	Accounting (604) Cost Accounting	5	Economics (712) Statistical Analysis	2
				Accounting (630) Governmental Accounting and Budgeting	3

MUNICIPAL ADMINISTRATION (OPTIONAL)

Economics (716) Public Control of Economic Processes	2	Economics (717) Public Control of Economic Processes	2	Economics (718) Public Control of Economic Processes	2
Social Administration (626) Penology	3	Social Administration (639) Social Statistics	5	Social Administration (668) Community Organization Resources	4
Elective	5	Social Administration (855) Public Recreation	3	Law Municipal Corporations	3

RHETORIC AND ENGLISH LANGUAGE

(See Speech)

ROMANCE LANGUAGES AND LITERATURES

Office, 111 Derby Hall

PROFESSORS HENDRIX, MOORE, HAVENS, ROCKWOOD, MONROE, ANIBAL, DEMOREST AND SCHUTZ, ASSISTANT PROFESSORS ARMITAGE AND GUTIERREZ

Students intending to major in Romance Languages are urged to elect the following course outside the department: History of France (History 624, 625), Principles of the Historical Stud. of Language (German 705), the History of Philosophy (Philosophy 601-602-603), Vulgar Latin (Latin 627). No student will be considered as a candidate for the M.A. degree unless his program includes at least two courses exclusively for graduates.

French 801 and 802 are required of candidates for the Master's degree in French.

Spanish 805 and 806 are required of candidates for the Master's degree in Spanish.

GRADUATE ROMANCE CLUB

The Graduate Romance Club fosters an interest in advanced work in the Romance Languages and Literatures. Its meetings, held monthly, consist of reports by graduate students or faculty members on their own investigations as well as on books and articles bearing on the field.

The problems of graduate students and themes suggested by faculty members will be discussed. Regular attendance of graduate students in the department is strongly urged.

FRENCH

Requirements for the Master's Degree: French: Graduate work in this field presents two main aspects: the linguistic, the literary. The candidate for the Master's degree should have: (1) a good command of written and oral French (to be tested by examination during one of the early Quarters of graduate work); (2) a general knowledge of the development of the French language from the earliest times and of French literature from the 16th century on. The final comprehensive examination covering the above fields will be written, and will include at least one question to be answered in French. A minimum reading list as a general guide in the preparation for this examination can be obtained at the office of the Department of Romance Languages.

In addition to the advanced courses (or their equivalent) covering the field of the final written examination, the candidate should complete French 801, 802, 813 (Old French language and literature), 880 (Methods of Research), and at least two seminars in French Literature (French 811, 812, or 817). The Master's thesis may deal either with a linguistic or a literary subject. The final oral examination will be devoted chiefly to the field of the thesis and will be conducted at least partly in French.

Requirements for the Doctor's Degree: French as Major: In addition to the requirements for the Master's degree in French, as outlined above, the candidate should have a more extensive and a more intensive knowledge of French linguistics and literature, with emphasis upon one field or the other, according to the nature of the specialization indicated by the dissertation. This knowledge should include Old French language and literature, and either old Spanish or Old Italian language.

In work completed for the doctorate, exclusive of Ph.D. thesis, at least forty-five hours, including that completed for the master's degree should be in work in the "800" or "900" area.

The candidate should have first and second minor fields, ordinarily represented by the Spanish (including Spanish-American) and the Italian or Portuguese languages and literatures. Reading lists as guides in the preparation of these fields can be obtained at the office of the Department of Romance Languages. A minimum of five hours of "600" work or above in the first minor is required. The courses chosen are to be approved by the student's adviser and by the Graduate Committee of the Department. There will be no general examinations on the second minor. For the first minor, the candidate shall select a minimum of three fields, or periods, as for example, The Renaissance, Classicism, the Eighteenth Century, Romanticism, Contemporary, etc., with the approval of the adviser and the Graduate Committee, and shall present himself for a written examination in these fields at least one Quarter before taking his General Examination in his major field. At least part of this general written examination in the major field will be conducted in French. The language requirements of the Graduate School, which normally involve a reading knowledge of French and German, must be met before the candidate takes his general examinations in his major field. These examinations are given not later than the middle of the second Quarter prior to the Quarter in which the candidate plans to come up for his degree.

The doctoral dissertation may deal either with a linguistic or a literary subject related to French. A final oral examination, conducted at least partly in French, is given in the field of the dissertation.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

*603. The Romantic Period in French Literature, 1800-1850. Five credit hours. Autumn Quarter. Five recitations each week. Lectures, collateral reading and reports. Given biennially, alternating with French 604. General prerequisites must include an introductory course in modern French literature. Mr. Demorest.

The development of romanticism and rise of realism in the first half of the Nineteenth Century in the novel, poetry, and drama.

604. French Literary Currents, 1850-1914. Five credit hours. Autumn Quarter. Five recitations each week. Lectures, collateral reading, discussions, reports. Given biennially, alternating with French 603. General prerequisites must include an introductory course in modern French literature. Mr. Demorest.

Realism, naturalism, and the movements of reaction in the novel and drama. The Parnassians and the Symbolists in poetry. Modern French literary critics.

*616. French Literature of the Renaissance. Five credit hours. Spring Quarter. Five recitations each week. Given biennially, alternating with French 617. General prerequisites must include an introductory course in modern French literature. Mr. Moore.

Marot, Rabelais, the Pléiade, Montaigne.

617. French Classicism, 1600-1715. Five credit hours. Spring Quarter. Five recitations each week. Given biennially, alternating with French 616. General prerequisites must include an introductory course in modern French literature. Mr. Rockwood.

The formation of the classic spirit. The perfection of dramatic form and the Seventeenth Century portrait of man. Selected works of Malherbe, Descartes, Pascal, La Bruyère, Boileau, Corneille, Molière, and Racine.

618. French Literature of the Enlightenment. Five credit hours. Winter Quarter. Five recitations each week. Given biennially, alternating with French 640. Mr. Havens.

A study of the ideas of the Eighteenth Century in their relation to modern times. Special emphasis on Montesquieu, Voltaire, Diderot, and Rousseau.

619. French Translating and Interpreting. Three credit hours. Spring Quarter. Three recitations each week. General prerequisites must include six Quarters of French or the equivalent with a grade not lower than "C". Mr. Havens.

Translating from French to English and from English to French. Practices in rapid oral and written interpretation. This course is helpful in preparing for military, diplomatic, or other special service where exact linguistic knowledge is needed.

*627. French Pronunciation. Three credit hours. Three meetings each week with laboratory practice. General prerequisites must include six Quarters of collegiate French or the equivalent, with a grade not less than "C" and permission of the instructor must be obtained. This class is limited to twelve.

The formation of French sounds. Lectures, with exercises in the use of the symbols of the International Phonetic Association. A systematic study of the rules of French pronunciation. Careful drill in the reading of French. Designed for advanced students who expect to teach French

Not open to students who have credit for French 632.

*628. Modern French Syntax. Five credit hours. Autumn Quarter. General prerequisites must include six Quarters of collegiate French or the equivalent, with a grade not less than "C," or consent of the instructor. Mr. Schutz.

A careful study of French grammar, with composition to illustrate.

* Not given in 1946-1947.

632. French Pronunciation and Diction. Five credit hours. Autumn Quarter. Five meetings each week with laboratory practice. General prerequisites must include six Quarters of collegiate French or the equivalent, with a grade not less than "C" and permission of the instructor must be obtained. The class is limited to twelve. Mr. Rockwood.

The formation of French sounds. Lectures, with exercises in the use of the symbols of the International Phonetic Association. A systematic study of the rules of French pronunciation and diction. Careful drill in the reading of French. Designed for advanced students who expect to teach French.

Not open to students who have credit for French 627.

*633. Modern French Drama. Three credit hours. Lectures, collateral reading, and reports. General prerequisites must include an introductory course in modern French literature or equivalent.

The end of the Nineteenth and the early years of the Twentieth Centuries. The Théâtre Libre, Realism, Naturalism, comedy, and psychological drama. Becque, Bernstein, Brieux, Mirbeau, Courteline, Porto-Riche, Curel, and others.

*634. Contemporary French Drama. Three credit hours. Lectures, collateral reading, and reports. General prerequisites must include an introductory course in modern French literature or equivalent. Mr. Havens.

Symbolistic, religious, realistic, and psychological drama. The "school of silence." Théâtres d'avantgarde. Comedy. Jean-Jacques Bernard, Claudel, Lenormand, Raynal, Sarment, Giraudoux, Jules Romains, and others.

635. Cours de Civilisation Française. Three credit hours. Winter Quarter. General prerequisites must include the equivalent of six Quarters of French and permission of the instructor. The course is conducted in French. The class is limited to fifteen. Given in alternate years. Mr. Demorest.

A study of the major developments of French culture down to the Nineteenth Century. The course is designed to give the student greater facility in understanding, speaking, and writing French.

636. La Civilisation Française Moderne. Three credit hours. Spring Quarter. General prerequisites must include the equivalent of six Quarters of French. The course is conducted in French. Given in alternate years. Mr. Demorest.

The principal object of the course is to increase the student's facility in understanding, speaking, and writing French. The material for discussion is drawn from the life, institutions, and culture of Nineteenth and Twentieth Century France.

*638. Advanced Spoken and Written French. Three credit hours. General prerequisites must include six Quarters of French or the equivalent with a grade not lower than "C". Mr. Havens.

Intensive practice in speaking and writing French based on contemporary usage.

*640. France in Contemporary Literature. Five credit hours. Winter Quarter. Lectures, collateral readings, and reports. General prerequisites must include an introductory course in French literature. Mr. Rockwood.

Recent developments in the novel, essay and poetry and their relationships with French life. Proust, Gide, Barbusse, Duhamel, Maurois, Romains, Morand, Malraux, Colette, Claudel, Valery, and others. Regionalism, etc.

650. Modern French Poetry. Three credit hours. Lectures, discussions and reports. Mr. Demorest, Mr. Strauss.

The sources and processes of poetic creation as exemplified in selected works of the modern French poetic pathfinders.

651. Contemporary French Poetry. Three credit hours. Lectures, discussions and reports. Mr. Demorest, Mr. Strauss.

The aims and techniques of Twentieth Century French poetry, with special emphasis on the explorations of the last twenty-five years.

* Not given in 1946-1947.

655. La France vue a travers le conte. Three credit hours. This course is conducted in French. Mr. Demorest.

The course is designed to develop proficiency in speaking and writing French, and to provide materials drawn from outstanding authors, illustrating modern French traits and preoccupations.

660. French Literature from the Renaissance to the Revolution. Five credit hours. Autumn Quarter. Five class meetings each week. Lectures, collateral readings, and reports. General prerequisites must include an introductory course in French literature. Mr. Havens.

A survey of the main writers and tendencies of the Renaissance in France, of French Classicism, and of the eighteenth century Enlightenment, with special reference to inter-relations with English literature.

This course is intended for students not majoring in Romance Languages.

701. Minor Problems in French. Three to five credit hours. Autumn, Winter, and Spring Quarters. Professors.

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Education, Course 692.

ITALIAN

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

611. Dante's Life and Work. Three credit hours. Winter Quarter. Three lectures each week. Given in alternate years. General prerequisites must include Italian 602 or the permission of the instructor must be obtained. Mr. Moore.

Reading of the *Vita Nuova* and *The Inferno*, Cantos 1-16.

701. Minor Problems in Italian. One to five credit hours. Autumn, Winter, and Spring Quarters. Mr. Moore.

PORTUGUESE

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

604. Modern Brazilian Literature. Three credit hours. Winter Quarter. Three recitations each week. Mr. Schutz.

Study of the more important figures of the Nineteenth Century and the contemporary period with emphasis on the latter.

608. Types of Portuguese Literature. Three credit hours. Spring Quarter. Three recitations each week. Mr. Schutz.

A survey of Portuguese literature by genres. Attention will be given to Camoens, the romantic poets, Eça de Queiroz and others. The Portuguese influnce on Brazil will be emphasized wherever possible.

701. Minor Problems in Portuguese. Three to five credit hours. Autumn, Winter, and Spring Quarters. Mr. Schutz.

SPANISH

Requirements for the Master's Degree: Spanish: Graduate work in this field presents two main aspects: the linguistic, the literary. The candidate for the Master's degree should have: (1) a good command of written and oral Spanish (to be tested by examination during one of the early Quarters of graduate work); (2) a general knowledge of the development of the Spanish language from the earliest times and of Spanish literature from 1500 on (Spanish-American literature may be substituted for certain of the modern Spanish literature courses

upon the approval of the department). The final comprehensive examination covering the above fields will be written, and will include at least one question to be answered in Spanish. A minimum reading list as a general guide in the preparation for this examination can be obtained at the office of the Department of Romance Languages.

In addition to the advanced courses (or their equivalent) covering the field of the final written examination, the candidate should complete Spanish 805, 806, 880 (Methods of Research) and at least two seminars in Spanish or Spanish-American literature. The Master's thesis may deal either with a linguistic or a literary subject. The final oral examination will be devoted chiefly to the field of the thesis and will be conducted at least partly in Spanish.

Requirements for the Doctor's Degree: Spanish as Major: In addition to the requirements for the Master's degree in Spanish, as outlined above, the candidate should have a more extensive and a more intensive knowledge of Spanish linguistics and literature, with emphasis upon one field or the other, according to the nature of the specialization indicated by the dissertation. This knowledge should include Old Spanish language and literature, and either Old French or Old Italian language.

In work completed for the doctorate, exclusive of Ph.D. thesis, at least forty-five hours, including that completed for the master's degree should be in work in the "800" or "900" area.

The candidate should have first and second minor fields, ordinarily represented by two of the following: French, Italian, Portuguese languages and literatures. Reading lists as guides in the preparation of these fields can be obtained at the office of the Department of Romance Languages.

A minimum of five hours of "600" work or above in the first minor is required. The courses chosen are to be approved by the student's adviser and by the Graduate Committee of the Department. There will be no general examinations on the second minor. For the first minor, the candidate shall select a minimum of three fields, or periods, as for example, Literature of the Golden Age, the Nineteenth Century, Contemporary Spanish-American Literature, etc., with the approval of the adviser and the Graduate Committee, and shall present himself for a written examination in these fields at least one Quarter before taking his General Examination in his major field. At least part of this general written examination in the major field will be conducted in Spanish.

The language requirements of the Graduate School, which normally involve a reading knowledge of French and German, must be met before the candidate takes his general examinations in his major field. These examinations are given not later than the middle of the Second Quarter prior to the Quarter in which the candidate plans to come up for his degree.

The doctoral dissertation may deal either with a linguistic or a literary subject related to Spanish. A final oral examination, conducted at least partly in Spanish, is given in the field of the dissertation.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

605. Advanced Composition and Conversation. Three credit hours. Autumn Quarter. Three recitations each week. Given in alternate years. General prerequisites must include a course in Spanish composition and a "600" course in Spanish literature.

This course, conducted wholly in Spanish, is designed especially for prospective teachers and for persons desiring a practical command of the language. The subject matter will be for the most part in history, customs, and manners of Spain.

606. Advanced Composition and Conversation (Continued). Three credit hours. Winter Quarter. Three recitations each week. Given in alternate years. General prerequisites must include Spanish 605.

This course, conducted wholly in Spanish, is designed especially for prospective teachers and for persons desiring a practical command of the language. The subject matter will be for the most part in history, customs, and manners of Spain.

607. The Modern Spanish Novel. Five credit hours. Autumn Quarter. Four meetings each week, a fifth at the option of the instructor. Given biennially, alternating with Spanish 609-610. General prerequisites must include an introductory course in modern Spanish literature. Mr. Hendrix.

A careful study of the development of the modern Spanish novel, reading of representative authors. Lectures, collateral reading, and reports.

608. The Modern Spanish Novel (Continued). Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. Given biennially, alternating with Spanish 609-610. General prerequisites must include an introductory course in modern Spanish literature. Mr. Hendrix.

A careful study of the development of the modern Spanish novel, reading of representative authors. Lectures, collateral reading, and reports.

*609. **Romantic Drama and Poetry in the Nineteenth Century.** Five credit hours. Autumn Quarter. Four meetings each week, a fifth at the option of the instructor. Given biennially, alternating with Spanish 607-608. General prerequisites must include an introductory course in modern Spanish literature. Mr. Hendrix.

A survey of the movements in Spanish drama and poetry during the first half of the Nineteenth Century. Lectures, collateral reading, and reports.

*610. **Modern Spanish Drama.** Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. Given biennially, alternating with Spanish 607-608. General prerequisites must include an introductory course in modern Spanish literature. Mr. Hendrix.

A survey of the movements in Spanish drama and poetry during the second half of the Nineteenth Century. Lectures, collateral reading, and reports.

*611. **Drama of the Golden Age.** Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. Given in alternate years. General prerequisites must include an introductory course in modern Spanish literature. Mr. Anibal.

An intensive study of a limited number of plays of the representative dramatists. Lectures, collateral reading, discussion, and reports.

613. **The Picaresque Novel.** Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. General prerequisites must include an introductory course in modern Spanish literature.

An intensive study of Lazarillo de Tormes, Guzman de Alfarache, and El Buscón. Lectures, collateral readings, discussion, and reports.

614. **Cervantes.** Five credit hours. Autumn Quarter. Four meetings each week, a fifth at the option of the instructor. Given in alternate years. General prerequisites must include an introductory course in modern Spanish literature. Mr. Anibal.

A study of the works of Cervantes with especial emphasis on the Quixote. Lectures, collateral reading, discussion, and reports.

*615. **Survey of Spanish Literature from the Earliest Times to the Seventeenth Century.** Five credit hours. Autumn Quarter. Four meetings each week, a fifth at the option of the instructor. Given in alternate years. General prerequisites must include an introductory course in modern Spanish literature. Mr. Anibal.

Lectures, collateral reading, discussion, and reports.

*616. **Survey of Spanish Literature of the Seventeenth and Eighteenth Centuries.** Five credit hours. Winter Quarter. Four meetings each week, a fifth at the option of the instructor. Given in alternate years. General prerequisites must include an introductory course in modern Spanish literature. Mr. Anibal.

Lectures, collateral reading, discussion, and reports.

617. **Modern Spanish Syntax.** Five credit hours. Autumn Quarter. Five recitations each week. General prerequisites must include an introductory course in modern Spanish literature. Mr. Anibal.

A course designed for advanced students who expect to teach Spanish. Appreciation of the details of grammar, illustrated with composition and with analysis of contemporary texts.

620. **Spanish Pronunciation and Diction.** Five credit hours. Winter Quarter. Five recitations each week. General prerequisites must include an introductory course in modern Spanish literature.

Careful and detailed study of special problems involved in teaching Spanish to English-speaking students. Laboratory analysis of differences between English and Spanish pronunciation.

* Not given in 1946-1947.

623. Spanish Translating and Interpreting. Three credit hours. One Quarter. Winter and Spring. Three recitations each week. General prerequisites must include Spanish 605, or equivalent, with a grade not lower than "C." Mr. Anibal.

This course gives experience in rapid translation from English to Spanish and from Spanish to English such as may be demanded in military or diplomatic service.

*626. The Spanish Drama of the Sixteenth Century. Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. General prerequisites must include an introductory course in modern Spanish literature. Mr. Anibal.

630. Survey of Spanish-American Literature. Five credit hours. Spring Quarter. Four meetings each week, a fifth at the option of the instructor. General prerequisites must include an introductory course in modern Spanish literature. Mr. Hendrix.

A study of the masterpieces of Spanish-American literature up to 1900. Lectures, collateral reading, discussion, and reports.

†640. Twentieth Century Spanish Literature. Three credit hours. Lectures, collateral readings, and reports. General prerequisites must include an introductory course in modern Spanish literature. Mr. Hendrix.

The Generation of 1898 and its successors, particularly the essayists and poets. Lectures, collateral reading, discussion and reports.

*641. Twentieth Century Spanish Literature (Continued). Three credit hours. Lectures, collateral readings, and reports. General prerequisites must include an introductory course in modern Spanish literature. Mr. Hendrix.

The Generation of 1898 and its successors, particularly the essayists and poets. Lectures, collateral reading, discussion and reports.

*650. Spanish America in Twentieth Century Literature. Three credit hours. Autumn Quarter. Lectures, collateral readings, and reports. General prerequisites must include an introductory course in modern Spanish literature. Mr. Hendrix.

The course will be devoted to Poets of the "New Generation" including Gabriela Mistral, Pedro Prado, Enrique Banchs, Alfonsina Storni, Vincente Huidobro, Juana de Ibarbourou and Jorge Louis Borges, and the contemporary novel of the Argentine, including the works of César Duayen, Roberto J. Payró, Enrique Rodríguez Larreta, Manuel Gálvez, Benito Lynch, Ricardo Güiraldes and Hugo Wast.

*651. Spanish America in Twentieth Century Literature (Continued). Three credit hours. Winter Quarter. Lectures, collateral readings and reports. General prerequisite must include an introductory course in modern Spanish literature. Mr. Hendrix.

This course will take up the contemporary novel of Uruguay in the works of Justino Zavala Muniz and Horacio Quiroga, in Chile of Eduardo Barrios and F. Santiván, in Bolivia of Alcides Arguedas, in Ecuador of Jorge Icaza, in Colombia of José Eustacio Rivera, in Venezuela of Rufino Blanco Fombona, Rómulo Gallegos, and Teresa de la Parra, in Mexico of Mariano Azuela, Rafael Delgado, José López Portillo y Rojas, Federico Gamboa, Mauricio Magdaleno, Lopez y Fuentes, Icaza, Rubén Romero, and Mena Brito, in Guatemala of Rafael Arévalo Martinez, in Cuba of Loveira, and in Santo Domingo of Tulio M. Cestero.

*652. Spanish America in Twentieth Century Literature (Continued). Three credit hours. Spring Quarter. Lectures, collateral readings and reports. General prerequisites must include an introductory course in modern Spanish literature.

This course will take up the later works of contemporary writers in Spanish American literature.

* Not given in 1946-1947.
† Not given during the academic year, 1946-1947.

***660. The Comedia of Lope de Vega and his School.** Three credit hours. General prerequisites must include an introductory course in modern Spanish literature.

The development of Lope's formula and a study of representative plays; Tirso de Molina; Alarcón. Lectures, collateral reading, discussion, and reports.

701. Minor Problems in Spanish. One to five credit hours. Autumn, Winter, and Spring Quarters. Mr. Anibal, Mr. Hendrix.

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Education, Course 692.

ROMANCE LANGUAGES

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

FRENCH

801. Introduction to Old French Linguistics. Three credit hours. Winter Quarter. Three recitations each week. General prerequisites must include at least three years of collegiate French and some knowledge of Latin. French 813 is desirable but not essential. Mr. Schutz.

Elements of Old French phonology and morphology.

802. Introduction to Old French (Continued). Three credit hours. Spring Quarter. Three recitations each week. General prerequisites must include French 801. Mr. Schutz.

Continuation of Old French phonology and morphology, semantics. Some attention to text criticism. A short review of current attitudes and practices in Romance philology.

***803. Old Provençal.** Three credit hours. Winter Quarter. General prerequisites must include French 802. Mr. Schutz.

Study of the language and literature of the Troubadours; Appel's Provenzalische Chrestomathie (Leipzig, 6th edition).

***804. Old Provençal (Continued).** Three credit hours. Spring Quarter. General prerequisites must include French 803. Mr. Schutz.

Study of the language and literature of the Troubadours; Appel's Provenzalische Chrestomathie (Leipzig, 6th edition).

811. Seminar in French Literature. Three to five credit hours. Autumn Quarter. General prerequisites must include three years of collegiate French and permission of the instructor must be obtained. Mr. Havens.

Topic: Diderot.

812. Seminar in French Literature (Continued). Three to five credit hours. Winter Quarter. General prerequisites must include three years of collegiate French and permission of the instructor must be obtained. Mr. Demorest.

Topics: Marcel Proust and his signficance.

813. Old French Literature. Three credit hours. Autumn Quarter. General prerequisites must include three years of collegiate French. Mr. Schutz.

Introduction to the reading of Old French. Reading and discussion of the Chanson de Roland, the Yvain of Chrétien de Troyes, representative lyrics and the Tristan of Béroul. Lectures on the main currents of Old French Literature.

817. Seminar in French Literature. Three to five credit hours. Spring Quarter. General prerequisites must include three years of collegiate French and the permission of the instructor must be obtained. Mr. Rockwood.

Topic: Molière.

* Not given in 1946-1947.

880. Bibliography and Method. Three credit hours. Winter Quarter. Required of all graduate students specializing in French. Mr. Rockwood.

A course to acquaint graduate students with tools, problems and methods of linguistic and literary research.

950. Research in French Language or Literature. Autumn, Winter, and Spring Quarters. General prerequisites must include not less than four years of collegiate French and permission of the instructor must be obtained. Mr. Moore, Mr. Havens, Mr. Schutz, Mr. Demorest, Mr. Rockwood.

This course is designed to meet the needs of individual graduate students who are pursuing a major study in the Department of Romance Languages.

ITALIAN

950. Research in Italian Language or Literature. Autumn and Winter Quarters. Mr. Moore.

This course is designed to meet the needs of individual graduate students who are pursuing a major study in the Department of Romance Languages.

SPANISH

805. Old Spanish. Three credit hours. Autumn Quarter. General prerequisites must include not less than three years of collegiate Spanish and permission of the instructor must be obtained. Mr. Hendrix.

806. Old Spanish (Continued). Three credit hours. Winter Quarter. General prerequisites must include not less than three years of collegiate Spanish and permission of the instructor must be obtained. Mr. Hendrix.

815. Seminar in Spanish Literature. Three to five credit hours. Autumn, Winter, and Spring Quarters. Lectures, readings, and reports. General prerequisites must include not less than three years of collegiate Spanish and permission of the instructor must be obtained. Mr. Hendrix, Mr. Anibal.

***821. Old Spanish Literature.** Three credit hours. General prerequisites must include not less than three years of collegiate Spanish and permission of the instructor must be obtained. Mr. Hendrix, Mr. Anibal.

Certain masterpieces of Spanish literature often not included in the usual survey courses.

880. Bibliography and Method. Three credit hours. Winter Quarter. Required of all graduate students specializing in Spanish. Mr. Anibal.

A fundamental course for graduate students in the methods and tools of linguistic and literary appreciation and research.

950. Research in Spanish Language or Literature. Autumn, Winter, and Spring Quarters. General prerequisites must include not less than three years of collegiate Spanish and permission of the instructor must be obtained. Mr. Hendrix, Mr. Anibal.

This course is designed to meet the needs of individual graduate students who are pursuing a major study in the Department of Romance Languages.

* Not given in 1946-1947.

RURAL ECONOMICS AND RURAL SOCIOLOGY

Office, 113 Townshend Hall

PROFESSORS FALCONER, HENNING, McBRIDE, WERTZ, MANGUS, AND HAUCK, ASSOCIATE PROFESSORS MOORE AND SITTERLEY

NOTE: For Marketing courses given in cooperation with other departments, see the following courses:

Animal Husbandry 608. Live Stock Marketing.
Animal Husbandry 626. Marketing of Dairy Products.
Horticulture 628. The Marketing of Fruits and Vegetables.
Poultry Husbandry 603. Marketing Poultry Products.

Prerequisites for Graduate Work: General prerequisites include fundamental courses in economics or sociology.

Fields of study: The areas of specialization within the department include: (1) Farm organization and management, (2) Marketing farm products, (3) Rural sociology, (4) Farm prices, land use, agricultural policy, farm taxation, farm finance.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

RURAL ECONOMICS

602. Advanced Farm Organization. Three credit hours. Autumn Quarter. Three lectures each week. Mr. Falconer.

A more detailed and advanced consideration of the economic principles involved in farm organization. The application of these principles to current agricultural production problems.

603. Cooperation in Agriculture. Five credit hours. Winter Quarter. Five lectures each week. Mr. Henning.

A study of agricultural cooperation, mainly as found in the United States. The types of cooperative marketing, manufacturing and purchasing organizations, collective bargaining, cooperative credit and insurance.

605. The Agricultural Industry. Three credit hours. Winter Quarter. Three lectures each week. Mr. Falconer.

The importance of the agricultural industry to the welfare of the nation. Some characteristics of the farming industry. Foreign competition, present and prospective. State and federal regulation, encouragement and aid to agriculture in the United States and foreign countries.

610. Agricultural Credit. Three credit hours. Spring Quarter. Mr. Wertz.

The credit needs of agriculture and how they are met.

612. Prices of Farm Products. Three credit hours. Spring Quarter. Three lectures each week. Mr. Wertz.

A study of the prices of farm land and of farm products. Adjusting the farm business to meet price fluctuations.

613. Marketing Farm Products. Five credit hours. One Quarter. Autumn and Spring. Five lectures each week. Mr. Henning, Mr. McBride.

A study of local and terminal marketing services and agencies involved in the marketing of farm products.

***614. Business Management in Agricultural Marketing.** Three credit hours. Winter Quarter. Two lectures and one laboratory period each week. Given in alternate years. Mr. Henning.

A detailed study of representative agricultural marketing agencies, including their problems of administration, finance, selling, transportation and warehousing.

615. Land Economics. Three credit hours. Spring Quarter. Mr. Sitterley.

The uses and classification of rural land. The public interest in a land policy.

* Not given in 1946-1947.

RURAL SOCIOLOGY

606. Rural Sociology. Five credit hours. Winter Quarter. General prerequisites must include ten hours of general sociology. Mr. Mangus.

A general course in the sociology of rural life. Emphasizes the fundamental and conditioning factors in rural social development, rural social institutions and the nature of rural social organization.

608. Problems of Rural Population. Three credit hours. Autumn Quarter. General prerequisites must include ten hours of sociology or economics. Mr. Mangus.

A study of the changing composition, characteristics, and distribution of the population, the factors making for change, and the effects of population changes on rural social organization and disorganization.

611. Rural Youth and Social Living. Four credit hours. Autumn Quarter. General prerequisites must include ten hours of sociology or economics. Mr. Mangus.

A study of personal and social adjustment problems of rural young people as related to marriage and family living. Policies and programs for improvement in family relation in the rural environment.

SPECIAL PROBLEMS

RURAL ECONOMICS AND RURAL SOCIOLOGY

701. Special Problems. Three to fifteen credit hours, given in units of three or five hours a Quarter for one or more Quarters. Autumn, Winter, Spring. General prerequsites must include at least eight hours of work in the department and the consent of the instructor must be obtained. Mr. Falconer, Mr. McBride, Mr. Henning, Mr. Wertz, Mr. Sitterley, Mr. Hauck, Mr. Mangus.

This course is for students who desire to work out special problems in the field of rural economics and rural sociology.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

802. Rural Economics Seminar. One to three credit hours. Winter and Spring Quarters. Consent of the instructor must be obtained. Mr. Falconer.

950. Research in Rural Economics and Rural Sociology. Autumn, Winter, and Spring Quarters. Opportunity is offered to carry on special research in agricultural economics and rural sociology. Mr. Falconer, Mr. Henning, Mr. McBride, Mr. Wertz, Mr. Mangus, Mr. Hauck.

SCHOOL ADMINISTRATION

(See Education)

SOCIAL ADMINISTRATION

Office, 303 Social Administration Building

PROFESSORS STILLMAN, PATERSON, RECKLESS AND BATCHELOR, ASSOCIATE PROFESSORS BLACKBURN, HAMILTON, SHIMP AND GEORGE

GRADUATE CURRICULA IN SOCIAL ADMINISTRATION

The graduate curricula in Social Administration are designed to prepare students for professional positions in various fields of social work including community organization, social case work, group work and recreation, penology and corrections, and social research. Students whose general maturity, education and experience justify it, may be admitted to courses for which they are qualified without becoming candidates for a degree.

The several curricula offered by the School, and in fact the separate courses given, have been set up in acceptance of the proposition that the practice of social work is based on the

social sciences. It is therefore to be desired that students entering upon professional training shall have had at least fundamental courses in biology, psychology, economics, sociology, political science and history in their undergraduate work. Students desiring to become candidates for the Master of Arts degree in Social Administration should have at least thirty Quarter hours of work in the social and biological sciences relating to not less than two fields. Students having only minor deficiences in meeting this requirement may be admitted to graduate work on condition that such courses as will meet these deficiencies be taken as soon as practicable and without credit toward the degree. The specific courses required to meet the deficiency will be determined by the Entrance Board and the Director of the School.

MASTER OF ARTS DEGREE

The Master of Arts degree, which as is customary, is granted upon the completion of one academic year of graduate work, is not designed to meet the technical and time requirements which have been established for the professional degree of Master of Arts in Social Administration.

The courses to be taken will be determined by the faculty adviser with the approval of the Director of the School, and will be based upon the interests and needs of the student. A majority of the student's work will ordinarily be carried in the School of Social Administration.

Professional field work, which is required of all candidates for the Master of Arts in Social Administration, is not a part of the curriculum for the degree of Master of Arts.

MASTER OF ARTS IN SOCIAL ADMINISTRATION

All candidates for the degree of Master of Arts in Social Administration must take Social Administration 845 (Methods of Social Investigation) or must have had its equivalent. All candidates for the degree are subject to a final general examination prior to which an acceptable thesis must have been prepared. The student carries the thesis project on his own responsibility but under the guidance of his faculty adviser and in consultation with any other faculty member of the School into whose area of specialization the proper development of the thesis may lead. To assure a measure of familiarity on the part of the student with research problems and research methods in his own area of specialization and as a means of indicating to the Registrar credit to be given for the thesis, each student is required to register for Social Administration 950 during one or more Quarters to be decided on in consultation with his faculty adviser.

The program of study for each student (in addition to the general required courses listed above) will be arranged, with the assistance and approval of his faculty adviser and of the Director of the School, according to the particular field of social work in which the student desires to specialize and with proper consideration of recognized requirements for professional training in social work.

Any "600", "700" or "800" courses offered by the School of Social Administration or by other departments of instruction in the University are available, subject always to the approval of the adviser and appropriate instructor. All graduate students registered in "600" courses are required to complete a certain amount of work in addition to that required of undergraduates. This may consist of reading additional books on the subject, the presentation of reports, or such other work as the instructor in charge of the course may deem wise.

FIELD WORK

And indispensable part of professional education for social work is supervised field work. In this phase of his work the student, in continued consultation with his faculty adviser and under the skillful supervision of a professionally qualified supervisor in a social work agency of recognized standards, applies and tests the principles and methods with which he has become familiar through study and classroom discussion, and by responsible practice under supervision develops the skills of his profession. Field work is, therefore, not merely job experience or practice but an individualized educational experience integrated into a total professional preparation.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

618. The Field of Social Work. Four credit hours. One Quarter. Autumn, Winter, Spring.

A survey of contemporary social work by functional groupings of services such as social case work, group work and community organization. Emphasis on the objectives, processes and personnel requirements in each functional grouping. Consideration also given to the relationship of social work to other social developments and social forces, current and historical.

Not open to students who have credit for Social Administration 676.

621. Elementary Principles of Probation and Parole. Three credit hours. Winter Quarter. General prerequisites must include Sociology 625. Mr. Reckless.

A study of how offenders are placed and supervised on probation and parole.

626. Penology. Three credit hours. Autumn Quarter. General prerequisites must include Sociology 625. Mr. Reckless.

The handling and treatment of adult offenders by courts, jails, reformatories, prisons, probation, and parole.

627. Juvenile Delinquency and Its Treatment. Three credit hours. One Quarter. Winter and Spring. Mr. Reckless.

Juvenile delinquency as a social problem. Methods of treatment and prevention, including juvenile courts, clinics, probation, parole, correctional institutions, child placement, and recreational programs.

630. The Veteran and His Family. Three credit hours. Winter Quarter. Mr. Blackburn.

A study of the social welfare problems encountered by the veteran or service man and his family together with a presentation of the social services available for meeting such needs. Special attention to current developments and unmet needs.

631. Medical Implications in Rehabilitation. Three credit hours. Spring Quarter. General prerequisites must include fifteen hours of Social Administration including an elementary course in social administration and an elementary course in rehabilitation and ten hours of elementary sociology. Mr. Hamilton.

A presentation of the types of problems presented by the handicapped. The application of the principles of medicine in the rehabilitation of the handicapped individual.

632. Administrative and Community Relations in Rehabilitation. Three credit hours. Autumn Quarter. General prerequisites must include fifteen hours of Social Administration including an elementary course in social administration and an elementary course in rehabilitation and ten hours of elementary sociology. Mr. Hamilton.

The administrative aspects of rehabilitation involving a study of relations with official and unofficial agencies. Consideration of programs on the federal, state and local levels.

633. Methods and Techniques in Vocational Adjustment of the Handicapped. Three credit hours. One Quarter. Autumn and Winter. General prerequisites must include fifteen hours of Social Administration including an elementary course in social administration and an elementary course in rehabilitation and ten hours of elementary sociology. Mr. Hamilton.

A presentation of the techniques used in restoring the handicapped to greater employability. Integration of medical services with other community resources toward the vocational adjustment of the handicapped.

634. Public Health Institutions and the Social Worker. Three credit hours. Winter Quarter. General prerequisites must include fifteen hours of Social Administration including an elementary course in social administration and an elementary course in rehabilitation and ten hours of elementary sociology. Mr. Hamilton.

An examination of existing public health institutions, their place in the social structure, their strength and weakness in meeting the problems of the handicapped.

635. The Social Work Approach to Life Adjustments. Three credit hours. One Quarter. Autumn and Spring. Miss George.

The social work approach in assisting individuals to remove or surmount barriers in growth toward, or a maintenance of, life adjustments which are personally satisfying and socially useful.

636. Case Studies in Rehabilitation. Three credit hours. Winter Quarter. General prerequisites must include fifteen hours of Social Administration including an elementary course in social administration and an elementary course in rehabilitation and ten hours of elementary sociology. Mr. Hamilton.

A critical analysis of representative rehabilitation cases.

638. Field Methods in Social Investigation. Five credit hours. Autumn Quarter. Three class meetilngs and four hours in field or laboratory each week. Mr. Blackburn.

Statistical investigation of some phase of social life of the city. Drafting and using of schedules. The statistical interview. Editorial processes. Drafting of tables. Tabulation.

639. Social Statistics. Five credit hours. Winter Quarter. Three class meetings and two two-hour laboratory periods each week. Mr. Blackburn.

The interpretation of statistical data. Averages and ratios, measures of dispersion, graphic presentation, statistical text. A study of the fields of population and vital statistics, statistics of dependency, delinquency, and standard of living.

640. Social Statistics. Three credit hours. Spring Quarter. Two class meetings and one two-hour laboratory period each week. General prerequisites must include Social Administration 639. Mr. Blackburn, Mr. Cornell.

Interpretation of social data with special attention to the fields of dependency, delinquency, and standard of living. Index numbers, correlation, sampling. Special analysis using standard electrical tabulating equipment.

646. Group Work and Recreational Agencies. Four credit hours. One Quarter. Winter and Spring. Mr. Batchelor.

A study of the group work and recreational resources of the community; public and semi-public. Consideration of the principles and objectives of group work and of community recreation. The place of commercialized recreation in American cities and towns; legislative and other controls.

647. Leadership and Direction of Group Activities. Three credit hours. One Quarter. Autumn and Winter. Lectures, readings, practical demonstrations, field work. Sociology 645 is strongly recommended as a preliminary or concurrent course. Mr. Batchelor.

Consideration of problems of leadership and practice in methods of directing of boys' and girls' clubs and adult leisure groups. The use of active and quiet games, stories, music, dramatics, folk recreation, and crafts, including demonstrations, field trips, field practices, and instruction in the various techniques.

648. Organization and Direction of Specialized Group Activities. Three credit hours. Spring Quarter. Lectures, readings, demonstrations, and field observation. General prerequisites must include Sociology 645 and Social Administration 646 and open to others with consent of the instructor. Mr. Batchelor.

Consideration of various forms of special group agency programs such as vacation schools as conducted by social settlements and churches, leadership training courses, camps and institutes. Particular attention is given to the adaptation of these to the national programs of the Y.M.C.A., Y.W.C.A., Boy Scouts, Girl Scouts, and Camp Fire Girls.

650. Contemporary Group Work Methods. Five credit hours. Spring Quarter. General prerequisites must include Sociology 645 and Social Administration 646. Mr. Batchelor.

An analysis of the basic philosophy of social group work and its practical application in group leadership. Consideration of the organization and methods of the principal agencies in this field such as settlements, the Y.M.C.A., the Y.W.C.A., Boy Scouts, Girl Scouts, and Camp Fire Girls. Specialists from these various agencies will assist in the instruction.

652. Supervisory Problems in Group Work. Three credit hours. Spring Quarter. General prerequisites must include Sociology 645 and Social Administration 646 and 675 or the equivalents, or permission of the instructor. Mr. Batchelor.

Supervisory and departmental practices in the settlement, Y.M.C.A., Y.W.C.A., Boy and Girl Scouts, Camp Fire Girls, and similar organizations. Consideration of methods of recruiting, selection, training, supervision, and guidance of professional and volunteer personnel.

660. Public Assistance Services. Three credit hours. Winter Quarter.

A study of the various public assistance programs including Aid for the Aged, Aid to the Blind, Aid to Dependent Children and General Relief, and the general principles underlying them, the methods by which they are administered with particular attention to the role of the case worker in each of these programs.

668. Community Welfare Resources. Four credit hours. One Quarter. Autumn, Winter, Spring. Four class meetings each week. Mr. Clopper.

An analysis of the various types of social work resources commonly comprising a community's total welfare facilities with special attention to the functional interrelationships of agencies.

670-671. Community Health Organization. Three credit hours each. Winteer Quarter. Mr. Paterson.

The aims and historical developments of public health, with particular reference to England and the United States of America.

679. Legal Aspects of Social Work. Three credit hours. Autumn Quarter. Mr. Blackburn.

Discussion of the law as a means of social control; study of case law and statutes relating to those fields of the law which are of greatest concern to the social worker; the legal aid movement in the United States.

695. The Public Assistance Worker. Five credit hours. One Quarter. Autumn and Winter. Miss George.

An introductory course in public assistance. Client participation. Eligibility for aid. Determination of assistance in relation to client's specific needs and agency's policies.

696. Case Studies in Public Assistance. Five credit hours. One Quarter. Autumn, Winter, Spring. General prerequisites must include Social Administration 695. Miss George.

A critical analysis of representative public assistance cases with particular emphasis on budgeting and the practical interpretation of agency policies.

Not open to graduate students majoring in case work.

700. Special Problems. One to five credit hours. All Quarter. Permission of instructor must be obtained.

Individual study in some field of social interest. For problems in social statistics, training in the use of standard electrical tabulating equipment is given. Special opportunities are offered for study in the field of public housing.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

813. The Community Chest Movement. Four credit hours. Autumn Quarter. Open by consent of the instructor. Mr. Stillman.

Origin, development and present status. The business end of a Community Chest and its place in the field of welfare finance. Study of and report upon the Columbus Community Fund campaign for funds. Analysis of paper organizations of Community Chests of other cities.

814. Contemporary Social Work. Four credit hours. Winter Quarter. General prerequisites must include Social Administration 813. Open by consent of the instructor. Mr. Stillman.

An analysis of programs as actually operative in American communities. Methods of coordination in social work. The Community Chest and Councils of Social Agencies. Making a community program. Functional groupings in the field of social work.

815. Interpretation of Social Work. Four credit hours. Spring Quarter. General prerequisites must include Social Administration 813 and 814. Open by consent of the instructor. Mr. Stillman.

The place of education in a social work program. The message and the method of educational publicity.

816-817. Social Case Work. Four credit hours. 816, Autumn and Spring Quarters; 817, Winter Quarter.

The principles and methods of social case work and their application; case records used for study and discussion.

818. Advanced Case Work. Four credit hours. One Quarter. Autumn and Spring. General prerequisites must include Social Administration 816 and 817. All registrations require the approval of the instructor. Miss George.

Application of case work to the treatment of individuals with behavior difficulties. Formulation of treatment plans. Case materials extensively used.

Not open to students who have credit for Social Administration 860.

819. Case Work Treatment. Four credit hours. Winter Quarter. General prerequisites must include Social Administration 818. Miss George.

Consideration of some basic factors involved in the carrying out of case work treatment plans. Deals with the differential coordination in each case of the client's needs, the case worker's abilities, and her agency's limitations. Case material extensively used.

Not open to students who have credit for Social Administration 861.

820. Interviewing in Social Case Work. Three credit hours. Spring Quarter. General prerequisites must include Social Administration 818. Miss George.

A course to assist the student in acquiring facility in interviewing. Attention is directed toward understanding the caseworker-client relationship and toward appreciating the variables entering into interviews.

Not open to students who have credit for Social Administration 839.

821. Community Planning for Child Care. Three credit hours. Autumn Quarter.

Critical examination of child care programs, including both voluntary and governmental agencies. The place of such programs in a community welfare scheme as affected by state control or regulation. Influence of state regulations in developing standards of care in relation to children in their own homes, in institutions, or in foster homes.

Not open to students who have credit for Social Administration 620.

823. Substitute Parental Care. Three credit hours. Winter Quarter. General prerequisites must include Social Administration 816, 821, and 827. Miss George.

Consideration of the principles and methods of foster home placement including determination of need for placement, preparation and participation of child and parents, selection of substitute parents or institution, and follow-up. Basic case work concepts are applied to this specialized setting.

825. Medical Aspects of Social Work. Three credit hours. Winter Quarter. Medical lecturers.

Presentation of technical knowledge about diseases, especially those with definite social implications. Signs, symptoms, etiology of common diseases. The responsibility of the social worker in detecting and reporting disease, and in organizing medical care as a resource in social treatment. Cooperation of the social worker with the physician and with medical and public health agencies.

827. Psychiatric Aspects of Social Work. Three credit hours. One Quarter. Autumn and Spring.

The influence of modern psychiatry upon social work practice. Attention appropriate to the social worker is given to the development and functioning of emotional life and to the dynamics of behavior.

Not open to students who have credit for Social Administration 673.

830. Community Organization Processes. Three credit hours. Winter Quarter.

A study of the methods by which a social worker may assist in developing and maintaining his agency's service in the community and by which he may play a significant part in developing a progressive social program in the community. Attention given to methods for analyzing community needs, to the problem of inter-relating agencies, both public and private, in meeting these needs, and to the securing of community interest in and understanding of social work.

835. The Social Worker and Community Groups. Three credit hours. Autumn Quarter. Open by consent of the instructor. Mr. Stillman.

The social work executive as a specialist in the field of community planning.

836. National Social Work Agencies and Local Programs. Three credit hours. Winter Quarter. General prerequisites must include Social Administration 813. Open by consent of the instructor. Mr. Stillman.

Their historical development and influence. Contractual relations. Promotion. Education. Specialism. Standards.

837. Budgeting Community Social Work. Three credit hours. Spring Quarter. General prerequisites must include Social Administration 813 and 814. Open by consent of the instructor. Mr. Stillman.

Principles and methods of budgeting. The budget in relation to money raising and social planning.

840. Probation and Parole. Three credit hours. Spring Quarter. General prerequisites must include two courses in criminology. Mr. Reckless.

The individual treatment of the delinquent. The organization of probation and parole. The probation and parole systems of the different states. A critical analysis of the methods of probation and parole.

841. Public Welfare Administration. Three credit hours. Spring Quarter.

Principles in the administration of welfare activities by departments of government, local, state and federal. Emphasis on administrative problems of personnel, finance, public relations and social planning in relation to family welfare and child care.

843. The Administration of Social Work Agencies. Three credit hours. Spring Quarter.

An introduction to the basic factors in the administration of social agencies.

845-846. Methods of Social Investigation. Four credit hours. Autumn and Winter Quarters. Required of candidates for advanced degrees in social administration who have not had equivalent work. Mr. Blackburn.

A course designed to prepare students to do independent social research involving the simpler statistical methods. Students will undertake a class project involving the collection of data and analysis of the results.

847-848-849. Research in Penology. One to four credit hours. Autumn, Winter, and Spring Quarters. Open on consent of the instructor. It is assumed that the student who takes this course shall have had one year's work in criminology and penology. Mr. Reckless.

853. Administrative Relationships in Group Work. Three credit hours. Winter Quarter. Mr. Batchelor.

A study of methods of coordination of voluntary group work agencies with public education and public recreation agencies. Consideration of the elements involved in the correlation of various units functioning within each of these three fields.

855. Public Recreation: Its Organization and Administration. Three credit hours. Winter Quarter. Mr. Batchelor.

Consideration of public provision for the use of leisure with particular reference to methods of organization and administration of playgrounds, community centers and school centers.

857. Administration of Statistical Projects. Three to five credit hours. Autumn Quarter. General prerequisites must include Social Administration 845-846 or equivalent.

The principles and methods of administration. Organization of office and field work, standards of personnel, methods of control, budgetary problems. Students will participate in supervision of a project.

858-859. Planning Statistical Studies. One to three credit hours. Winter and Spring Quarters. General prerequisites must include Social Administration 845-846 or equivalent.

Analysis of selected subjects for field investigation. Delimitation of inquiry; determination of sampling method; drafting of outline of report, skeleton tables, schedule and instructions or questionnaire, coding system and punch card for use in tabulating data on standard electrical tabulating equipment.

862. Psychiatric Applications in Social Work. Three credit hours. Winter Quarter. General prerequisites must include Social Administration 673 or 827.

Application of the principles presented in Social Administration 827 to several varieties of individual social maladjustment commonly encountered in social work practice. Special attention to the emotional content of maladjustment with regard to marriage and parenthood, economic self-maintenance, and physical health.

875. Field Work. One to fifteen credit hours. Summer, Autumn, Winter, and Spring Quarters. Open only to graduate students in Social Administration. Each field placement must be arranged in consultation with student's faculty adviser.

Practical work in the various areas of social administration under the supervision of the organization in these areas and the instructors.

876. Administration of Correctional Institutions. Three credit hours. Winter Quarter. General prerequisites must include Social Administration 626 or 627 or permission of the instructor. Mr. Reckless.

The organization and management of various types of correctional institutions. Attention to problems of program, personnel, intake, classification, and release.

877. The Function and Operation of Welfare Institutions. Three credit hours. Autumn Quarter.

Growth and expansion of welfare institutions. Composition of institutional population. Analysis of programs. Problems of personnel and management. The impact and results of institutional care.

950. Research in Social Administration. Autumn, Winter, and Spring Quarters. All instructors.

Individual projects selected and prosecuted in consultation with the instructor.

SOCIOLOGY

Office, 111 Commerce Building

PROFESSORS DENUNE, NORTH, RECKLESS AND BATCHELOR, ASSOCIATE PROFESSOR CUBER, ASSISTANT PROFESSORS HARRIS, HATT, WOLFF, NISSEN AND BENNETT

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

600. The Modern Family. Four credit hours. One Quarter. Autumn, Winter, Spring. Mr. Denune, Mr. Cuber.

An examination of the results of the impact of modern culture upon the family with special reference to such factors as size of family, member relationships, economic problems, divorce, desertion, status of women.

601. Types of Family Organization. Four credit hours. Spring Quarter. Mr. Denune.

A survey of family organization from primitive times to the present; an analysis of the factors that entered into their development.

604. Race Problems. Three credit hours. Autumn Quarter. Mr. Hatt.

Contemporary adjustment problems of Negro, immigrant, and Jew. Racial and national differences, population shifts, economic adjustments, health, family life, citizenship, leisure pursuits, religion, and education.

Not open to students who have credit for Sociology 608.

605. Race Relations. Three credit hours. Winter Quarter. Mr. Hatt.

A study of majority and minority group relations, ideology of race, interracial conflicts, institutional changes, personality disorganization, planned assimilation, acculturation as a natural process.

607. Race Contacts and Culture Conflicts. Four credit hours. Spring Quarter. Mr. Harris.

Problems arising from contact of culture, with particular attention to the acculturation of preliterate peoples by European civilization.

612. Primitive Social Organization. Three credit hours. Autumn Quarter. Three class meetings each week. Mr. Bennett.

The course provides a familiarity with the principles of sociology which govern social relationships of certain of the simpler societies.

613. Primitive Religion. Three credit hours. Winter Quarter. Consent of the instructor must be obtained. Mr. Bennett.

An examination of the fundamental religious beliefs and practices of primitive peoples.

622. Human Nature and Social Adjustment. Three credit hours. Winter Quarter. Mrs. Robbins.

Nature of human nature; process of socialization; social change and individual demoralization; social roles in conflict situations; re-direction of social activity.

623. Collective Social Behavior. Three credit hours. Autumn Quarter. Mrs. Robbins.

A study of the kinds of mass action arising in crowds, mobs, strikes, audiences and the public. Problems and techniques of study and control.

625. Criminology. Three credit hours. One Quarter. Autumn and Spring. Mr. Reckless.

The nature, variation and causes of crime and delinquency. Studies of criminal liability, criminal careers, and organized crime and racketeering.

629. General Sociology. Four credit hours. Autumn Quarter. General prerequisites must include thirty hours in not more than two allied subjects. Mr. North.

A critical examination of the more fundamental ideas and concepts of modern scientific sociology.

***630. Indians of North America.** Three credit hours. Autumn Quarter. Alternate with Sociology 612.

A survey of the aboriginal peoples and cultures of North America from the earliest times to the present. Special attention is given to the tribes of Ohio. Slides, motion pictures, and study of the Ohio State Museum collections supplement the programs of classroom study.

***631. Indians of Central and South America.** Three credit hours. Winter Quarter. Alternate with Sociology 613.

A survey of the races and tribes of Central and South America from the earliest times to the present. Special attention will be given to the contemporary Indian and mixed populations. Slides, motion pictures, and museum study will supplement the classroom work.

645. Leisure and Recreation. Four credit hours. One Quarter. Autumn and Spring. Mr. Batchelor.

The sources of leisure in early and modern society. The social significance and uses of leisure. The social functions of play. Historical aspects of play. The recreation problem of modern communities from the standpoint of control and of public provision.

656. Rural Social Institutions. Four credit hours. Autumn Quarter. Mr. Denune.

The problems of health, recreation, social intercourse, housing, child welfare, dependency, defectiveness, and delinquency in American rural communities and small towns. The agencies and organizations dealing with these problems.

665. Propaganda and Social Control. Three credit hours. Autumn Quarter. Mr. Wolff.

The nature, methods and extent of propaganda, scientific information, rewards, punishment and other means of social control.

* Not given in 1946-1947.

667. Socio-Cultural Changes and Progress. Four credit hours. Spring Quarter. Mr. Wolff.

A review of the factors productive of socio-culture changes through the ages; an analysis of methods of change; changes are regarded as progress; tests of progress.

***674. Archaeological Training Expedition.** Eight credit hours. Full time in expedition camp. General prerequisites must include courses in anthropology and archaeology. Mr. Morgan and Museum staff.

Qualified students registering for this course will join the joint expedition of the Ohio State University and the Ohio State Museum, which will be engaged in excavating prehistoric sites in Ohio. Instruction and experience will be provided in every phase of archaeological field work. Prospective students should consult Mr. Morgan.

676. Social Classes. Four credit hours. Winter Quarter. Four class meetings each week. Mr. North.

Class distinctions as a phase of social differentiation. The origin and characteristics of social classes. The significance for modern society of class consciousness, class struggle, and social mobility.

677. Social Organization in a Changing World. Four credit hours. Spring Quarter. Four class meetings each week. Mr. North.

An examination of the adaptability of present institutional organization to the situation created by world reorganization. The impact of world problems upon American culture. Implications of democracy for social reconstruction.

678. Community Action and the School. Three credit hours. Autumn Quarter. Mrs. Robbins.

Nature and integration of the American Community; structure, processes, leadership of local social action groups; the participation of school personnel in cooperative efforts to solve local and regional problems.

680. Social Orientation of Children. Four credit hours. Winter Quarter. Three class sessions each week and one hour for field study of a child group. Mrs. Robbins.

A study of the ways in which society socializes children, with parallels from more stable or less complex cultures. Current breakdowns in the socializing process and implications from the school and other educational agencies.

700. Special Problems. One to four credit hours. Autumn, Winter, and Spring Quarters.

Individual study in some field of social interest.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

All candidates for degrees are required to register for Sociology 800 or Social Administration 845-846.

800. Introduction to Sociological Research. Four credit hours. Autumn Quarter. General prerequisites must include a course in elementary social studies. Mr. Hatt.

Delineation of a research problem in sociology. Uses of available sources of data. Sampling procedures of sociological research. Field methods for collecting original data. Sociometric instruments.

801-802-803. History of Sociological Thought. Two credit hours, Autumn, Winter, and Spring Quarters. One session each week. Readings, reports, lectures, and discussions. Given in alternate years. Mr. Wolff.

A survey of the most important literature representing the development of European sociology.

* Not given in 1946-1947.

805-806-807. American Sociological Theory. Two credit hours. Autumn, Winter, and Spring Quarters. One session each week. Readings, reports, lectures, and discussions. Given in alternate years. Mr. Hatt.

An intensive study of the theories concerning the origin, development, forms and nature of society, advanced by the leading American sociologists.

820. Seminar in Anthropology. Two credit hours. Autumn, Winter, and Spring Quarters. Mr. Bennett.

***827. Nationality and Nationalism.** Four credit hours. Autumn Quarter.

A survey of the religious, economic, political, and social backgrounds which underlie the contemporary development of national attitudes.

861-862-863. Social Planning and Reconstruction. Four credit hours. Autumn, Winter, and Spring Quarters. Mr. North.

The nature of social organization and disorganization and their relation to the total life of a society. Types of institutional patterns. Problems involved in efforts to effect purposive change. Gradualism and Revolution as modes of social reconstruction. A critical examination of the more prominent efforts at social planning in America and elsewhere.

Not open to students who have credit for Sociology 860.

864. Advanced Criminology. Four credit hours. Spring Quarter. General prerequisites must include Sociology 625 or its equivalent. Given in alternate years. Mr. Reckless.

Intensive study of the most important aspects of criminology.

890. Methodology in Sociological Research. Four credit hours. Spring Quarter. General prerequisites must include Sociology 800 and Social Administration 846 or their equivalents. Given in alternate years.

A critical evaluation of social surveys, areal and regional studies, the ecological approach, sociometric studies, prediction of outcome, and case study methods.

900. Seminars in Sociology. One to four credit hours each Quarter.

The different members of the department teaching staff who are qualified to offer graduate courses will organize seminars from time to time in their respective fields of specialization. Students should consult their advisers about these seminars before they register for any Quarter.

950. Research in Sociology. Autumn, Winter, and Spring Quarters.

Individual projects selected and prosecuted in consultation with the instructor.

(a) Social Organization; Social Movements. Mr. North.
(b) Modern Sociological Theory. Mr. North, Mr. Cuber.
(c) History of Sociological Thought. Mr. Hatt, Mr. Wolff.
(d) Social Control.
(e) The Family. Mr. Denune, Mr. Cuber.
(f) Criminology. Mr. Reckless.
(g) School and Community Relations. Mrs. Robbins.
(h) Race Relations. Mr. Hatt.
(i) Anthropology. Mr. Bennett.
(j) Leisure and Recreation. Mr. Batchelor.
(k) Rural Social Institutions. Mr. Denune.

SOILS

(See Agronomy)

SPANISH

(See Romance Languages and Literatures)

SPECIAL EDUCATION

(See Bureau of Special and Adult Education)

* Not given in 1946-1947.

SPEECH

Office, 113 Derby Hall

PROFESSORS YEAGER, KETCHAM, AND WILEY, ASSISTANT PROFESSORS MASON, BAHN, EMSLEY, MOSES, EWING, RILEY, McDOWELL, AND GERHARD

Prerequisites for Graduate Work: The completion of an undergraduate major in speech or its equivalent is a prerequisite for graduate work. Students who cannot meet this requirement immediately are advised to register as "Special Students" until it is completed. This requirement may be tested by either written or oral qualifying examinations. Each student must be able to write and to speak with reasonable clarity and good usage. Deficiencies must be made up to the satisfaction of the departmental graduate committee.

Requirements for Master's and Ph.D. Degrees: Candidates for the Master's Degree or for the Ph.D. degree are held responsible for a general understanding of speech bibliography and methods of research in speech and a thorough working knowledge of the bibliography and research methods appropriate to the thesis or dissertation. All Ph.D. candidates must show a general understanding of: (1) related studies in other University departments; (2) history and theories of rhetoric, rhetorical criticism, and public address; (3) history and theories of the theater, dramatic criticism, and oral interpretations; (4) speech correction, experimental phonetics and linguistic phonetics. Candidates for the Master's degree are held responsible for a general understanding of two of these four items.

Exceptions to these general requirements can be made only when a greater degree of specialization is justified.

Candidates for either the Master's or the Ph.D. degree must select from the following fields of concentration or specialization: (1) rhetoric and public address; (2) dramatics and oral interpretation; (3) phonetics and speech correction. Regardless of the field of concentration, Ph.D. candidates are required, and Masters' candidates are strongly advised, to have a general understanding of related content in other University departments.

Departmental Committee on Graduate Work: The administration of most of these requirements, especially those for specialization, will rest with the student's advisory and dissertation committees. All general requirements which are in addition to those of the Graduate School are administered by the Graduate Committee of the Department of Speech. The advisory committee and the program of the Ph.D. student in speech are subject to approval by the Graduate School. Such program must be submitted for approval not later than the middle of the second Quarter after the candidate is registered for the Ph.D. degree.

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

University requirements for any of the courses in this group specify a prerequisite of either (a) thirty Quarter hours in not more than two allied subjects, or (b) ten hours in such allied subjects and ten hours in Speech.

601. The Forms of Public Address. Five credit hours. Spring Quarter. Mr. Ketcham.

A study of special methods by which speech is made clear, interesting, and forceful. Practice in using these methods in the preparation and delivery of the different forms of public address, including nominating, dedicatory, eulogistic, after dinner, and general academic, political, and business speeches. A broad view of language training is given with the object of increasing the student's command of thought in writing and talking as well as in public speaking.

603. Group Thinking and Conference Leadership. Five credit hours. Winter Quarter.

The procedures used in exchanging information, solving problems, determining policies, and resolving differences in committees and other small groups. The methods of leading discussions and conferences.

Not open to graduate students majoring in speech.

***618. Historical American Phonetics.** Three credit hours. Autumn Quarter Three recitations each week. Permission of the instructor is required. Given in alternate years. Mr. Emsley.

General American pronunciation is studied in its historical background, and in comparison with eastern American, southern American, and accepted standard British. The alphabet of the International Phonetic Association, dictionaries, and records are used. Laboratory practice includes special work with dialects for use in dramatics or linguistic studies.

* Not given in 1946-1947.

620. Rhetorical Theory. Five credit hours. Autumn Quarter. General prerequisites must include Speech 601.

The principal rhetorical theories, as represented by Plato, Aristotle, Cicero, Quintilian, Longinus, Wilson, Bacon, Sheridan, Campbell, Whately, Phillips, Woolbert and others, are studied and compared. Attention is given to the great rhetorical movements from the earliest times to the present and the place of oratory among educational disciplines noted.

631-632-633. History of the Theatre. Three credit hours each Quarter. Autumn, Winter, Spring.

A general survey of the rise and development of the theatre: the Classical, Medieval, Renaissance, Commedia dell'arte, later English and Continental, and Modern Theatre. Particular reference will be given to the origin of theatrical forms, and to staging in relation to the forms along with the reading of selected plays, reports, and round-table discussions. Illustrations of stage and scenery will accompany each lecture.

***635-*636. Theatrical Criticism.** Three credit hours each Quarter. Winter and Spring. General prerequisites must include one of the following: English 676, 669, 670.

A survey of critical theories from the Greek to the modern period with particular reference to the influence of the theorists, the church, the state and the press in the development of the theatre. Illustrated lectures will establish the connection between critical opinion and stage practice. Attention will be given to an analysis of dramatic forms and conventions, a study of current newspaper and magazine criticisms with practice in writing reviews, and a consideration of the stage and the movies as art forms.

641. Theatrical Costuming. Five credit hours. Autumn Quarter.

Practical instruction in making theatrical costumes. Materials and their uses. How to analyze a play for costume requirements. Sources for authentic period costumes.

643. Children's Theatre. Three credit hours. Winter Quarter. General prerequisites must include Speech 645, 646, 647 or an equivalent.

Directing and producing plays for children. Improvizations of short scenes. Judging and editing the text. Each student will direct a short play.

644. Experimental Theatre. Three credit hours. Spring Quarter. General prerequisites must include Speech 645 and 648.

Production of original plays, particularly those dealing with folk and regional material. The technique of the living newspaper.

645. Stage Direction I. Three credit hours. Autumn Quarter. Two hours lecture and two hours laboratory each week. English 670 must be included in the general prerequisites or taken concurrently. Mr. Timmons, Mr. McDowell.

Study and practice in the fundamentals of stage direction. Aesthetic distance, unity, emphasis, rhythm, tempo, balance, stage business and interpretation of lines are considered. The class members direct short scenes.

646. Stage Direction II. Three credit hours. Winter Quarter. Two hours lecture and two hours laboratory each week. General prerequisites must include Speech 645. Mr. Timmons, Mr. McDowell.

Preparing the public performance; script, selection, casting, the rehearsal schedule, the textual study of the script, the director's problems at each stage of the rehearsal process. Each student will prepare a detailed textual study and will direct the production of an edited full-length contemporary play.

647. Stage Direction II. Three credit hours. Spring Quarter. Two hours lecture and two hours laboratory each week. General prerequisites must include Speech 646 and 633. Mr. Bahn, Mr. McDowell.

Preparing the public performance; the relationship of direction to other theatrical work; types of stage direction according to relationship between director and actor and according to style of direction; directing the historical play. Each student will prepare a detailed textual study and will direct the production of an edited, full-length historical play.

648-649-650. Playwriting. Three credit hours each Quarter. Autumn, Winter, Spring. General prerequisites must include one of the following courses: English 676, 669 or 670.

Elementary laboratory course in playwriting. Methods of play analysis with attention to dramatic technique. An historical consideration of the major forms of drama.

* Not given in 1946-1947.

656. Visual Hearing Techniques. Five credit hours. Winter Quarter. Miss Mason.

Speech and hearing problems. A course designed to assist teachers, speech correctionists, clinical psychologists, nurses, and medical students to better understand the speech and hearing needs of the deaf and hard of hearing cases referred to them. Clinical and laboratory practice afforded those interested in the practical applications of methods and technical procedures.

657. Hearing and Speech. Five credit hours. Spring Quarter. Conferences, readings, discussions, demonstrations. Speech 692 or 694 and 656 must be included in the general prerequisites or taken concurrently. Special permission of instructor to students with required background in allied fields. Miss Mason.

A consideration of hearing with respect to its effect on speech. Examination of researches in otology, medicine, audiometry, acoustics, residual hearing. Visual-hearing and speech rehabilitation. Clinical and laboratory experience.

†680. Anatomy, Physiology and Pathology of the Ear and Vocal Mechanisms. Five credit hours. General prerequisites must include twenty hours in speech or twenty hours in psychology or ten hours in speech and ten hours in psychology.

Lectures, readings, discussions, demonstrations and laboratory dissections presenting the structure, functions and diseases of the ear and vocal mechanisms and asociated structures.

692. Clinical Practice in Speech Correction. Five credit hours. Winter Quarter. Miss Mason.

Actual clinic practice in speech correction and training of visual hearing. The student will be given opportunity to study and work with a wide range of speech and hearing cases in the University Clinic, the Freshman Week Health Line, and in public school classes. To make arrangements he should, therefore, is possible communicate with the department well before the opening of the Quarter.

694. Speech Disorders Survey. Five credit hours. Autumn Quarter. General prerequisites must include course credit equivalent to a major in speech or allied departments, and a background satisfactory to the instructor. Miss Mason.

This course is designed to serve the needs of those concerned solely with minor speech correction, such as those entering the field of special education, or college, high school, and elementary school teaching. It will deal primarily with phonetic substitutions; foreign accent; lisping; nasal, strident, harsh, and muffled voices; work with the deaf and hard of hearing; and other similar speech, voice, and hearing deviations from the cultured social norm.

700. Minor Problems in Speech. One to five credit hours. Autumn, Winter, and Spring Quarters. Conference, library, and laboratory work. General prerequisites must include permission of the instructor and the chairman of the department. This course may be repeated for a total of fifteen credit hours. Departmental staff.

721. Survey and Analysis of Legal Speaking. Three credit hours. Winter Quarter. General prerequisites must include Speech 620.

Representative courtroom arguments of eminent lawyers from the earliest times to the present are analyzed, and the persuasive devices of the pleaders identified. Attention is given to cross-examination as a persuasive technique.

***722. Survey and Analysis of Occasional Speaking.** Three credit hours. Spring Quarter. General prerequisites must include Speech 620.

Representative popular or occasional speakers and their speeches in the churches, in political campaigns, in agitating for economic, social, educational, and political reforms, in informing and entertaining popular audiences, from the earliest times to the present are studied and analyzed. To be offered in alternate years.

† Not given during the academic year, 1946-1947.
* Not given in 1946-1947.

723. Survey and Analysis of Legislative Speaking. Three credit hours. Spring Quarter. General prerequisites must include Speech 620. To be offered in alternate years.

Representative speakers and their speeches of the Greek, Roman, European, British and American legislative assemblies, from the earliest times to the present, are studied in detail and their persuasive methods analyzed.

740. Theatre Organization and Management. Five credit hours. Winter Quarter. One two-hour session each week. Mr. Bahn, Mr. McDowell.

The course has two phases: (1) A general analysis of school, college, church, and community theatre organization and management. (2) An intensive study by each student of the history, organization, and special problems of a selected theatre.

Not open to students who have credit for Speech 850.

780. Audiometry. Three credit hours. Spring Quarter. General prerequisites must include Physics 645 and Speech 680.

A course designed to equip speech therapists, teachers of the deaf and hard of hearing, psychologists and public health nurses with the fundamental principles involved in the mechanics of acoustic measurement. Definition of theory, terms and general technique. Types of audiometers and methods used in measuring functional hearing. Study of audiograms, with relation to the indication of types of hearing deficiencies. Forms of sound amplification, and various kinds of mechanical hearing devices. Student observation of audiometric testing procedure and experience in actual testing under supervision.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

811. Survey of Experimental Techniques. Five credit hours. Autumn Quarter. Mr. Emsley.

This course is intended to give the advanced student in speech science, information and practice in carrying through precise research techniques of varying kinds, with a view to their application in the problem he proposes to undertake. It will involve the use of mechanical, electrical, photographic, acoustic, and other precision apparatus and techniques as applied to speech.

***816. Speech Pathology.** Five credit hours. Spring Quarter. General prerequisites must include Speech 692 and courses in allied fields satisfactory to the instructor. Miss Mason.

The serious and major speech impairments, traceable specifically to disease, mental inhibition, neuroses, psychoses, physiological mal-development or impeding growths, traumatic interference, etc. Stuttering and stammering, aphasia, aphonia, cleft-palate speech, disturbances traceable to mental retardation, auditory asthenia of varying kinds, spastic speech, etc. Types, degrees, causes, and consequences. Techniques of speech training involved.

820. Seminar in Public Address. Three to five credit hours. Autumn, Winter, and Spring Quarters. This course may be repeated for credit. Topic to be chosen from the following:

(a) Rhetorical Theory
(b) Speech Criticism
(c) Occasional Speaking
(d) Legal Speaking
(e) Legislative Speaking
(f) Group Thinking and Conference Leadership
(g) Argumentation and Debate

824. Pronunciation Norms. Five credit hours. Winter Quarter. General prerequisites must include ten hours in speech and ten hours in the English department satisfactory to the instructor. Mr. Emsley.

The norms of cultured American speech, deviations therefrom, and their historical origin. Methods of recording and analyzing the same. Field work and laboratory practice.

* Not given in 1946-1947.

840. Seminar in Theatre. Three to five credit hours. Autumn, Winter, and Spring Quarters. This course may be repeated for credit. Topic to be chosen from the following:

(a) History of the Theatre
(b) Theatrical Criticism
(c) Playwriting
(d) Theatrical Costume Design
(e) Childrens' Theatre
(f) Experimental Theatre
(g) Production
(h) Theatre Organization and Management

870. Studies in Ancient and Modern Rhetoric. Three credit hours. Winter Quarter. Mr. Wiley.

An historical survey of rhetorical theory from the Fifth Century B. C. to the present time. Special emphasis will be laid upon general trends in rhetorical theory as a background for the understanding of modern concepts of rhetoric. Consideration also will be given to the application of rhetorical theory to the critical analysis of classical and modern examples of great public addresses.

881-882-883. Studies in the Nature and Structure of Oral Words. Two credit hours. Autumn, Winter, and Spring Quarters. Students who enroll in 881 are expected to complete the sequence. Each course is a prerequisite to the succeeding course. Mr. Ketcham.

A consideration of spoken words as an evidence of man's early efforts to store and communicate meanings. Analysis on the basis of word-symbols, word concepts, and real words. The relation of word-concepts to the actuality which they reflect. Possible applications in speech problems of the various relationships between words and consciousness.

950. Research in Speech. Autumn, Winter, and Spring Quarters. Library, conference, and laboratory work. General prerequisites must include acceptable courses in the chosen field of research. The student may spend a part or all of his time on research work.

Research work in speech is done under the direction of those members of the staff in whose field the student's specialization lies.

SURGICAL RESEARCH

Office, 203 Kinsman Hall

PROFESSOR CURTIS, ASSISTANT PROFESSORS KLASSEN AND PUPPEL

FOR GRADUATES

900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

950. Surgical Research. All Quarters. Laboratory, dispensary or clinic, library and conferences. An opportunity for qualified students to investigate surgical principles and surgical diseases. Permission of the instructor is required. Mr. Curtis, Mr. Klassen, Mr. Puppel.

Particular opportunity is offered for the investigation of thyroid diseases, of iodine and calcium metabolism, of certain bone diseases, of gastro-intestinal disease, of the surgical aspects of tuberculosis, and of the pathological physiology of the spleen. The amount of time spent in research varies. At times the student may participate in the current research activities of the staff.

SURVEY COURSES

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. Prerequisite, permission of the instructor in charge who will decide in each individual case whether the student has had the necessary training to profit from the course.

ARTS SURVEY

605. Foundations of Contemporary Civilization. Five credit hours. One Quarter. Autumn, Winter, Spring. Five meetings each week. Mr. Evans, Mr. Waters.

This course is designed for all students majoring in subjects falling within the fields of biological and inorganic sciences, mathematics and psychology. The course deals with the changes of thought in religion, ethics, social and political philosophy in relation to the general intellectual and social changes of modern civilization. It concludes with a brief discussion of the chief problems of our present civilization.

608. Development of Modern Science. Five credit hours. One Quarter. Autumn and Winter. Five meetings each week. Mr. Spieker.

This course is designed especially for students who have not majored in science. Its purpose is to give the non-science student a general view of the historical development of scientific ideas, and to dwell upon the nature and validity of scientific hypotheses and theories from a scientific point of view. The course is also well adapted to assist the prospective teacher of science in greatly broadening his scientific foundations.

VETERINARY ANATOMY

Office, 204 Veterinary Laboratory

PROFESSOR GROSSMAN, MR. MAUGER

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

701. Problems in Veterinary Anatomy. Two to five credit hours. One Quarter. Autumn, Winter, Spring.

(a) **Special Problems in Veterinary Anatomy.** Mr. Grossman, Mr. Mauger.

This course offers advanced training and instruction in Veterinary Anatomy. The work is carried out as laboratory investigation of special problems.

(b) **Histologic Technique.** Laboratory work, three hours for each credit hour. Mr. Grossman, Mr. Mauger.

This course deals with the examination of the tissues with the aid of the microscope. The important methods in the preparatory steps required in collecting specimens, fixation, embedding, sectioning, staining, and mounting are considered.

Students electing this course should confer with the instructor in charge.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

950. Research in Veterinary Anatomy. Autumn, Winter, and Spring Quarters. General prerequisites must include a course in the topographic anatomy of the domestic animals. Permission of the instructor must be obtained before registering for the course. Mr. Grossman.

Opportunity is offered for working on special problems in the anatomy of the domestic animals.

VETERINARY MEDICINE

Office, 103 Veterinary Laboratory

PROFESSORS HOBBS, SCHALK, REBRASSIER, AND KRILL

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

701. Special Problems in Veterinary Medicine. Two to five credit hours each Quarter. Autumn, Winter, Spring. Mr. Hobbs, Mr. Schalk, Mr. Edgington, Mr. Krill.

Not open to students who have credit for Veterinary Medicine 626.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

950. Research in Veterinary Medicine. Autumn, Winter, and Spring Quarters. General prerequisites must include acceptable courses in the chosen field of research. Mr. Hobbs, Mr. Krill.

VETERINARY PARASITOLOGY

Office, 4 Veterinary Laboratory

PROFESSOR REBRASSIER, MR. KOUTZ, AND CATCOTT

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

623. Advanced Veterinary Parasitology. Two to five credit hours each Quarter. Autumn, Winter, Spring. Conference, laboratory, and museum work. Mr. Rebrassier, Mr. Koutz, Mr. Catcott.

A course designed primarily for graduates in Veterinary Medicine who plan to specialize in Veterinary Parasitology. It includes a review of literature, detailed study of classification, morphology, life histories and economic importance.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

826. Special Parasitological Problems. Three to ten credit hours each Quarter. Autumn, Winter, Spring. General prerequisites must include Veterinary Parasitology 623 and permission of the instructor. Mr. Rebrassier, Mr. Koutz, Mr. Catcott.

950. Research in Veterinary Parasitology. Autumn, Winter, and Spring Quarters. Library, conference, and laboratory work. General prerequisites must include acceptable courses in the chosen field of research. Mr. Rebrassier, Mr. Koutz.

VETERINARY PATHOLOGY

Office, 135 Veterinary Clinic

PROFESSOR GOSS, ASSISTANT PROFESSOR CASE, MR. COLE, MR. KISSLING
ASSOCIATE PROFESSOR KINGMAN

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

610. Pathology Technique. Two to five credit hours each Quarter. Autumn, Winter, Spring. Laboratory work, three hours for each credit hour. Mr. Goss.

Practice in the methods of laboratory diagnosis, consisting of collecting the specimens, their fixation and embedding, and the sectioning of such tissues, together with practice in laboratory diagnosis and the recognition of disease processes in tissues.

615. Advanced Special Pathology. Two to five credit hours each Quarter. Autumn, Winter, Spring. Laboratory work, three hours for each credit hour. General prerequisites must include Veterinary Pathology 610. Mr. Goss.

An advanced course in the pathology of infectious diseases with special reference to anatomical and microscopical lesions and methods of diagnosis together with detailed studies of the lesions of specific diseases under consideration.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

801. Veterinary Pathology. Three to ten credit hours each Quarter.

(a) Special Anatomical Pathology. Mr. Goss.

Special problems in gross and microscopic pathology with regard to the accommodations of the course to particular projects which may be given due consideration.

(b) Special Bovine Pathology. Mr. Goss.

This is to accommodate those students doing graduate work in some special field of bovine pathology. The selection of projects is quite variable, allowing for special problems in this field.

(c) Special Poultry Pathology. Mr. Goss.

This course allows for the study of poultry diseases with specialization in any pathological processes concerned with poultry diseases.

950. Research in Veterinary Pathology. Summer, Autumn, Winter and Spring Quarters. Library, conference and laboratory work. General prerequisites must include acceptable courses in the chosen field of research. The individual may spend a part or all of his time on research work. Mr. Goss.

VETERINARY PHYSIOLOGY AND PHARMACOLOGY

Office, 202 Veterinary Laboratory

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

701. Minor Problems in Physiology and Pharmacology. Three to fifteen credit hours. Autumn, Winter, and Spring Quarters. Designed for qualified students who wish to begin research. Permission of department chairman is required for registration. Mr. Kingma.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

950. Research in Physiology and Pharmacology. Autumn, Winter, and Spring Quarters. General prerequisites must include courses in comparative physiology or pharmacology, or equivalent courses and the permission of the department chairman.

The department is equipped to supervise research dealing with special problems in physiology and pharmacology.

VETERINARY PREVENTIVE MEDICINE

Office, 203 Veterinary Laboratory

PROFESSOR SCHALK, ASSISTANT PROFESSOR HELWIG

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

701. Special Problems in Preventive Veterinary Medicine. Two to five credit hours. One Quarter. Autumn, Winter, Spring. Mr. Schalk.

Special courses can be pursued in genetics, environmental, biologic and food hygiene.

Not open to students who have credit for Veterinary Preventive Medicine 650.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

950. Research in Veterinary Preventive Medicine. Autumn, Winter, Spring and Summer Quarters. General prerequisites: The applicant should be able to fully satisfy the instructor and department chairman that he possesses adequate interest in and general capability to successfully pursue graduate work in a chosen field of preventive medicine—genetic, environmental, biologic or food hygiene. Mr. Schalk, Mr. Helwig.

VETERINARY RESEARCH

Office, Animal Disease Laboratories, Reynoldsburg, Ohio

PROFESSORS EDGINGTON, HOBBS, SCHALK, REBRAISSIER, AND KRILL, ASSISTANT PROFESSOR HELWIG

The departmental laboratories wherein the major portion of the active work is conducted are located near Reynoldsburg, about ten miles from Columbus. Here well-equipped laboratories and facilities for housing and isolation of experimental animals, including poultry, are available. These laboratories represent a focal point for the animal disease investigations of the Veterinary College, Ohio Agricultural Experiment Station, and the Department of Agriculture of Ohio.

The work of the department is of interest primarily to advanced and graduate students, but information regarding various projects under study is available to other courses presented by the College.

The facilities of the department provide ample opportunities for the interested and able veterinary student to pursue a variety of studies under the direction of the staff.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

950. Veterinary Research. Autumn, Winter, and Spring Quarters. General prerequisites must include satisfactory evidence of an interest in and

ability to pursue the projects undertaken.

This course is designed to accommodate the needs in different lines of veterinary research. The work will be outlined by the instructor to meet the requirements of the individual student.

While research primarily in the fields of infectious, parasitic, and nutritional diseases is under the supervision of the staff members, Mr. Edgington, Mr. Rebrassier, and Mr. Schalk, other lines of study may be arranged under appropriate leadership. A close working relationship is maintained by the entire staff on all problems under consideration in the department.

VETERINARY SURGERY AND CLINICS
Office, 115 Veterinary Clinic

PROFESSOR GUARD AND STAFF

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

701. Special Problems in Veterinary Surgery. One to five credit hours each quarter. All Quarters. Mr. Guard and surgical staff.

Advanced work in surgery, gynecology or obstetrics.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

810. Advanced Clinical Technique. Three to ten credit hours. All Quarters. A course intended to give the student more intensive clinical experience in one or more of the following divisions of our clinic.

(a) Contagious infectious diseases. Mr. Schalk.
(b) Medical (large animal). Mr. Krill.
(c) Medical (small animal). Mr. Hobbs.
(d) Parasitological. Mr. Rebrassier.
(e) Surgical (large animal). Mr. Guard.
(f) Surgical (small animal). Mr. Guard.
(g) Dispensary. Mr. Guard and instructor.
(h) Ambulatory. Mr. Guard and instructor.

Permission of department chairman and instructor is required.

950. Research in Veterinary Surgery and Clinical Technique. All Quarters. Laboratory, library and conferences. Qualified students have the opportunity:

(a) To investigate surgical principles, surgical diseases and problems in the fields of roentgenology, gynecology and obstetrics. Mr. Guard and surgical staff.

(b) To pursue intensive study of some particular problem in one or more of the clinical divisions enumerated under course 810. Mr. Guard and clinical staff.

Permission of department chairman and instructor is required.

VOCATIONAL EDUCATION
(See Education)

ZOOLOGY AND ENTOMOLOGY
Office, 101 Botany and Zoology Building

PROFESSORS SNYDER, DeLONG, PETERSON, KENNEDY, D. F. MILLER, PRICE, KOSTIR AND RIFE, ASSOCIATE PROFESSORS DUNHAM, J. A. MILLER, HAUB, KNULL AND DAMBACH, ASSISTANT PROFESSORS DAVIDSON, TIDD, BORROR, VENARD, J. N. MILLER, PADDOCK AND LEEDY

Requirements for Advanced Degrees: In addition to the fixed requirements of the University, the Department of Zoology and Entomology requires that the candidate for the Master's degree shall have had, at the time of the comprehensive examination, fundamental training in the following subjects: organic or biological or agricultural chemistry, botany and any three of

the following groups: anatomy or vertebrate zoology, invertebrate zoology, embryology, or genetics, plant or animal physiology, plant pathology or bacteriology. Additional requirements in the special field in which the degree is taken will be indicated by the adviser. The candidate for the Doctor's degree, in addition to the fixed requirements of the University and all of the groups indicated above, shall have had at the time of the comprehensive examination, a fundamental knowledge of the following subjects: college algebra and statistics, physics, ecology and geology or evolution, besides familiarity with the current literature. Additional requirements in the special field of research will be indicated by the adviser.

ZOOLOGY

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

601. Advanced Human Heredity. Three credit hours. Autumn Quarter. Three lecture-discussion periods each week. General prerequisites must include a course in principles of heredity and permission of the instructor must be obtained. Mr. Snyder.

This is a study of human inheritance, with especial emphasis on the methods of research in this branch of genetics. The mathematical analysis of human pedigrees is intensively studied.

602. Advanced Genetics. Three credit hours. Winter Quarter. Three lecture-discussion periods each week. Given in alternate years. General prerequisites must include a course in principles of heredity and permission of the instructor. Mr. Rife.

A study of recent advances in genetics, with special reference to chromosomal aberrations. The interaction of heredity and environment in man is discussed particularly from the standpoint of the study of twins.

605. Animal Behavior. Three or five credit hours. Autumn Quarter. One lecture and four or eight laboratory hours each week. Mr. J. A. Miller.

This course is devoted to the study of the neurological basis of animal reactions with emphasis on the mechanics of adjustment to heat, light, chemical, and mechanical stimulation.

606. Insect Behavior. Three credit hours. Winter Quarter. One lecture and four laboratory periods each week. Mr. D. F. Miller.

This course is devoted to the study of the responses of insects to the stimulating factors of their environment. These studies are directed toward the types of behavior which are important in insect control.

609. Animal Microtechnic. Three or five credit hours. Autumn Quarter. A laboratory course. Laboratory work, assigned readings, and conferences. This course is designed for students intending to major in one of the biological sciences. The class is limited to twelve students and permission of the instructor must be obtained before registering for the course. Mr. Kostir, Mr. J. N. Miller.

Theory and practice of microscopic methods, including fixing, embedding, sectioning, and staining of animal tissues, making permanent preparations, and special manipulation of the microscope and its accessories.

610. Animal Parasites. Five credit hours. Winter Quarter. Two lectures and three two-hour laboratory periods each week. Mr. J. N. Miller.

This course covers the general principles of parasitology, the morphology, life history, and classification of parasites, and their host relationships. Recommended for students preparing for medical or zoological work.

Not open to students who have credit for Zoology 504.

617. General Cytology. Three to five credit hours. Winter Quarter. Three lectures and two two-hour laboratory periods each week. Permission of the instructor must be obtained before registering. Mr. Kostir.

A study of protoplasm, the organization of living cells, and the fundamental phenomena of life.

618. The Cytological Basis of Genetics. Three or five credit hours. Spring Quarter. Three lectures and two two-hour laboratory periods each week. General prerequisites must include a course in heredity. Zoology 617 is desirable, but not essential. Permission of the instructor must be obtained before registering for this course. Mr. Kostir, Mr. Paddock.

A study of the cellular basis of heredity, variation and evolution, with special emphasis on the chromosomes and their behavior.

620. Advanced Zoology of Vertebrates. Five credit hours. Spring Quarter. Three lectures and two two-hour laboratory periods each week. General prerequisites must include elementary courses in zoology. A course in evolution and one Quarter in comparative anatomy are also desirable. Mr. Price.

A study of the various vertebrate groups, emphasizing their origin, phylogeny, classification, life histories, habits, distribution, and economic importance. Laboratory, museum and field work. Especially recommended for students specializing in biological science.

625. Advanced Zoology of Invertebrates I. The Protozoa. Five credit hours. Autumn Quarter. Two lectures and three two-hour laboratory periods each week. General prerequisites must include elementary courses in zoology. Mr. Kostir.

Zoology 625, 626, and 627 are fundamental courses designed to give the student a general knowledge of the structure, life histories, habits, and relationships of the invertebrate animals. While it is preferable that these courses be taken in the order given, this is not essential, and any one of the three may be elected independently of the others. Course 625 deals with the protozoa, including both free-living and parasitic forms.

626. Advanced Zoology of Invertebrates II. Five credit hours. Winter Quarter. Two lectures and three two-hour laboratory periods each week. General prerequisites must include elementary courses in zoology. Mr. Kostir.

A study of the structure, life histories, habits and relationships of sponges, coelenterates, worms, and arthropods, together with the consideration of important biological principles illustrated by these groups. Note statement under Zoology 625.

627. Advanced Zoology of Invertebrates III. Five credit hours. Spring Quarter. Two lectures and three two-hour laboratory periods each week. General prerequisites must include elementary courses in zoology. Mr. Kostir.

A study of the structure, life histories, habits and relationships of molluscs, echinoderms, brachiopods, and bryozoa, together with the consideration of important biological principles illustrated by these groups. Note statement under Zoology 625.

630. The Interpretation of Biological Data. Three credit hours. One Quarter. Autumn and Winter. Two lectures and one two-hour laboratory period each week. General prerequisites must include advanced standing in biological science and permission of the instructor must be obtained. Mr. Green.

An introductory course in bio-statistics. For the general biological student who may not anticipate extensive use of statistical methods the aim will be to develop an appreciation of the general principles of statistical inference and to indicate the historical connections between the study of statistics and the study of biological variability. The consistent use of "small sample" statistics will serve to prepare the research student for advanced work in biometry.

640. Wildlife Conservation. Five credit hours. Autumn Quarter. Three lectures and two two-hour laboratory periods each week with several Saturday field trips. General prerequisites must include twenty hours of biological sciences. Mr. Dambach.

An introductory course in the conservation and management of wildlife resources of the United States. The course is designed to acquaint students with the important wild animals of the United States, their value, relation to man and methods of regulating their abundance. Particular attention will be given to Ohio problems.

641. Methods and Techniques in Wildlife Management. Five credit hours. Winter Quarter. Three lectures and two two-hour laboratory periods each. General prerequisites must include twenty hours of biological science and permission of the instructor must be obtained. Mr. Dambach.

A study of research and management techniques employed in the field of wildlife conservation. Consideration will be given to methods of collecting and preserving biological specimens, making food habits studies, measuring animal populations, field mapping, interpre-

tation of animal signs in the field, control methods and other practical management techniques. This course is especially designed for majors in the field of wildlife conservation.

643-644-645. Wildlife Conservation Conference. One credit hour. Autumn, Winter, and Spring Quarters. General prerequisites must include twenty hours of biological science. Mr. Dambach, Mr. Leedy.

Review of current research. Reports on subjects related to wildlife conservation by visiting technicians. Reports on special subjects assigned to students.

701. Special Problems. Three or five credit hours each Quarter. Autumn, Winter, Spring. A student may enter at the beginning of any Quarter. General prerequisites must include satisfactory preparation for individual work in the field of the chosen problem. The student may have free choice of the instructor under whom he desires to work, but the permission of the instructor must be obtained before registering for the course.

(a) Animal Behavior. Mr. D. F. Miller, Mr. J. A. Miller.
(b) Animal Ecology. Mr. Calhoun, Mr. Dambach, Mr. Price.
(c) Embryology and Vertebrate Zoology. Mr. J. A. Miller, Mr. Price.
(d) Genetics and Biometry. Mr. Green, Mr. Paddock, Mr. Rife, Mr. Snyder.
(e) Invertebrate Zoology. Mr. Kostir.
(f) Ornithology. Mr. Calhoun.
(g) Parasitology. Mr. J. N. Miller, Mr. Tidd, Mr. Venard.
(h) Protozoology and Cytology. Mr. Kostir.
(i) Teaching of Biology. Mr. Haub and Mr. D. F. Miller.
(j) Wildlife Management. Mr. Dambach.

NOTE: TEACHING COURSES. For the Teaching Course in this department see the Department of Education, Course 683.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

These prerequisites include an adequate knowledge not only of zoology but also of related sciences. It is desirable that the student should have a reading knowledge of French and German.

808. Comparative Embryology. Five credit hours. Autumn Quarter. Three lectures and two two-hour laboratory periods each week. Open to graduate students with the consent of the instructor. Mr. Price.

A survey of various modes of embryonic development, illustrated with both invertebrate and vertebrate types. Emphasis is placed on fundamental aspects and processes of development. Both descriptive and experimental methods will be used in the laboratory work.

***815. The Statistical Design of Biological Experiments.** Five credit hours. Winter Quarter. Three lectures and two two-hour laboratory periods each week. Zoology 630 or its equivalent must be included in the prerequisites or taken concurrently. Permission of the instructor must be obtained. Mr. Green.

An intensive study of the application of the methods of "analysis of variance and covariance" to a wide variety of biological problems. Special attention will be paid to questions of experimental arrangement and special topics in advanced biometry will be reviewed.

950. Research in Zoology. Autumn, Winter, and Spring Quarters. Mr. Snyder, Mr. DeLong, Mr. Peterson, Mr. Kennedy, Mr. Kostir, Mr. Price, Mr. D. F. Miller, Mr. Rife, Mr. J. A. Miller, Mr. Tidd, Mr. Borror, Mr. Venard.

Problems in development, life history, morphology, ecology, genetics, animal behavior, parasitology, taxonomy, or other zoological or entomological subjects may be undertaken. For some of these the opportunities are particularly good in summer at the Biological Laboratory. Students interested should send for the Franz Theodore Stone Laboratory Bulletin.

* Not given in 1946-1947.

ENTOMOLOGY

FOR ADVANCED UNDERGRADUATES AND GRADUATES

600 and 700 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

†650. Entomology for Biology Teachers. Five credit hours. Three lectures and two two-hour laboratory periods each week. Mr. Davidson.

The course deals with the economic importance of insects, their general characteristics, morphological structure, metamorphosis, and control. A survey of the orders and families of insects with special emphasis on the biology and ecology of the most important families. The laboratory will consist of studies of the most important insect groups, how to make an insect collection, preparation of killing bottles, preserving insects for study, culturing insects for class use and for class demonstrations. Recommended especially for biology teachers or for students who desire a general knowledge of insects.

651. Advanced Entomology. Five credit hours. Autumn Quarter. Two lectures and three two-hour laboratory periods each week. General prerequisites must include ten hours of zoology and ten hours of entomology or other biological science. Mr. Kennedy.

This course deals with the comparative external morphology, the evolutionary history and classification of insects; laboratory work is systematic and material will be furnished, but it will be preferable if the student collects and pins material for himself during the summer preceding.

652. Advanced Entomology. Five credit hours. Winter Quarter. Two lectures and three two-hour laboratory periods each week. General prerequisites must include ten hours of zoology and ten hours of entomology or other biological science. Mr. Kennedy.

This course deals with insect behavior, life histories, and particularly with ecological principles governing occurrence and distribution of insect species, and the principles underlying insect control. The laboratory work is systematic.

653. Chemical Control of Insect Pests. Five credit hours. Autumn Quarter. Three lectures and two three-hour laboratory periods each week. General prerequisites include elementary courses in zoology and in general and economic entomology, or equivalent. A background of training in physics and quantitative chemistry is desirable.

These courses deal primarily with insecticides—their properties, toxicology, relative value, and use. Stomach and contact insecticides are studied.

654. Chemical Control of Insect Pests. Five credit hours. Spring Quarter. Two lectures and two three-hour laboratory periods each week. General prerequisites must include elementary courses in zoology and in general and economic entomology or equivalent. A background of training in physics and quantitative chemistry is desirable.

Fumigation and other control measures are studied.

655. Insects in Relation to Disease. Three or five credit hours. Spring Quarter. Three lectures each week. Students who register for five credit hours will have two two-hour laboratory periods in addition. General prerequisites must include introductory courses in zoology, also it is advisable to have had beginning courses in entomology, bacteriology, and animal parasites. Mr. Venard.

This course gives students in animal husbandry, bacteriology, medicine, veterinary science, and others an opportunity to become familiar with the recognition characteristics, habits, and controls of immature and adult insects, ticks, mites, and other arthropods that attack man and domestic animals. Considerable attention is paid to those species that transmit various diseases of man and animals. Especially recommended for premedical students.

658. Insect Ecology. Five credit hours. Autumn Quarter. Three lectures and two two-hour laboratory periods each week. Mr. DeLong.

A study of the environmental factors under which insects live and their relationship to the production of insect populations and control phases. This involves the study of climate, the

† Not given during the academic year, 1946-1947.

relationship of temperature, humidity, precipitation, and evaporation to biology of insects, the problems of hibernation, aestivation, and such applied problems as the effect of cropping, rotations and cultivation upon the development of insect populations.

659. Social Insects. Two or five credit hours. Spring Quarter. Two lectures and three two-hour laboratory periods each week. The student may take the two lectures for two credit hours or the lectures and laboratory for five credit hours. General prerequisites must include ten hours of zoology and ten hours of other biological science. Mr. Kennedy.

This course deals with the social insects, including termites, social wasps, bees and ants, particularly with the theory of evolution of the family and society in insects.

660. Entomological Literature and Principles of Taxonomy. Five credit hours. Winter Quarter. Given in alternate years. Mr. Kennedy.

Lectures on the development of entomological writing, studies of Government and Experiment Station bulletins and other publications, assigned readings, and preparation by each student of a report or review upon some publication. Intended to familiarize the student with past and current publications and give him command of the published records in his field of study.

A study of the principles of classification with lectures on taxonomic systems, codes of nomenclature, etc. Practical work in the classification of a selected group or groups of insects or other animals.

***662. Household Insects.** Three credit hours. Spring Quarter. Two lectures and one two-hour laboratory period each week.

A study of the characteristics, biology, and control of insects that annoy man or damage his buildings or goods therein. The course is also intended to acquaint the students with present practices and future possibilities of the pest control industry. Field trips will be made to observe the work of local pest control operators.

Not open to students who have credit for Entomology 562.

665. Immature Insects. Three or five credit hours. One Quarter. Autumn and Spring. One lecture and two or four two-hour laboratory periods each week. General prerequisites must include Entomology 651 and 652 or equivalents. Mr. Peterson.

This course gives a student an opportunity to become familiar with the characters used in determining families, genera and species of immature stages of insects, especially larvae. The laboratory work deals primarily with the determination of larvae. Library and field work are included. A student collection of immature stages of insects determined to families is required. Topics such as external morphology of immature insects and methods of collecting, killing, preservation and preparation of material are discussed.

701. Special Problems. Three to five credit hours each Quarter. Autumn, Winter, Spring. A student may enter at the beginning of any Quarter. General prerequisites must include satisfactory preparation for individual work in the field of the chosen problem. The student may have free choice of the instructor under whom he desires to work, but the permission of the instructor must be obtained before registering for the course. Offered at Columbus and Wooster.

(a) Apiculture and Insect Pollination. Mr. Dunham.

(b) Immature Insects and Biological Control. Mr. Peterson.

(c) Insects Causing or Transmitting Diseases of Animals. Mr. Venard, Mr. Davidson.

(d) Insects Causing or Transmitting Diseases of Plants. Mr. DeLong, Mr. Davidson.

(e) Insect Control (Chemical). Mr. Davidson, Mr. DeLong, Mr. Waters.

(f) Insect Ecology. Mr. Dambach, Mr. DeLong.

(g) Insect Embryology and Morphology. Mr. Kennedy.

(h) Insect Physiology and Toxicology. Mr. Dethier.

* Not given in 1946-1947.

(i) Insect Taxonomy and Literature. Mr. Davidson, Mr. DeLong, Mr. Kennedy, Mr. Knull.

(j) Laboratory Technique and Rearing Methods. Mr. Peterson.

(k) Social Insects. Mr. Kennedy.

FOR GRADUATES

800 and 900 Courses. A statement of the general prerequisites for all courses in this group will be found immediately following the heading, "DEPARTMENTS OF INSTRUCTION," page 46.

814. Biological Control of Insect Pests. Five credit hours. Winter Quarter. Four lectures and one two-hour laboratory period each week. Open to graduate students with the consent of the instructor. Mr. Peterson.

An advanced course dealing with the biological agents which help to bring about a balance or control of insects. The topics considered are diseases of insects, vertebrate and invertebrate predators and insects parasitic on or within insects. The laboratory work consists largely of special assigned problems and library work.

816. Research Methods: Living Insects. Five credit hours. Spring Quarter. Three lectures and two two-hour laboratory periods each week. Open to graduate students with the consent of the instructor. It is advisable to have Entomology 658, 651 and 652 before taking this course. Mr. Peterson.

A course designed for the purpose of introducing students to methods and equipment employed today by research entomologists in their studies of living insects. Particular attention is paid to the equipment and methods employed in measuring environmental factors under laboratory and field conditions. Also, methods of rearing insects, methods of conducting life history studies, trapping insects, sampling and other information useful for entomologists now in or preparing to enter field research work are discussed. A portion of the laboratory work consists of special assigned problems.

817. Morphology and Development of Insects. Five credit hours. Autumn Quarter. Two lectures and three two-hour laboratory periods each week. Mr. Kennedy.

An advanced comprehensive course on the internal structures of insects, together with what is known of their functions, morphology, histology, embryology, and metamorphosis. The laboratory is handled as an individual research problem for each student and may be continued in succeeding Quarters as research.

The success of this work depends on the material collected and preserved by the student preceding the course. Methods for collecting and preserving material should be taken up with the instructor in charge at the end of the Spring Quarter preceding. Students coming from other institutions are expected to write for instructions.

818. Advanced Course on Immature Insects. Three or five credit hours. Winter Quarter. One conference hour and two or four two-hour laboratory periods each week. General prerequisites must include Entomology 665 or its equivalent. Mr. Peterson.

This course is designed to give graduate students an opportunity to become familiar with the immature stages of special groups of insects. So far as possible determination to species in the groups selected will be made. Some of the groups available for study are among aquatic insects, larvae of mosquitoes, midges, dragon flies and others; and among terrestrial groups, larvae of noctuids, tortricids, pyralids, elaterids, cerambycids, tenthredinids and others. Library work is expected.

***850. Insect Physiology. Five credit hours. Winter Quarter. Two lectures and two three-hour laboratory periods each week. The instructor must be consulted before registering.**

This course will be confined to quantitative aspects of insect physiology, dealing chiefly with the results of laboratory investigations on the chemistry of insect structures, body contents, and products, and on digestion, blood excretion, respiration, nutrition, and growth. The relations of insect physiology to the chemical control of insects will be stressed.

950. Research in Entomology. Autumn, Winter, and Spring Quarters. Offered at Columbus and Wooster. Mr. Barrows, Mr. Peterson, Mr. DeLong, Mr. Kennedy, Mr. D. F. Miller, Mr. Davidson, Mr. Borror.

Problems in development, life history, morphology, ecology, genetics, animal behavior, parasitology, taxonomy, or other zoological or entomological subjects may be undertaken. For some of these the opportunities are particularly good in summer at the Biological Laboratory. Students interested should send for the Franz Theodore Stone Laboratory Bulletin.

* Not given in 1946-1947.

BULLETINS ISSUED ANNUALLY BY THE OHIO STATE UNIVERSITY

Graduate School

College of Agriculture

School of Home Economics

College of Arts and Sciences

School of Journalism

School of Optometry

College of Commerce and Administration

School of Social Administration

College of Dentistry

College of Education

School of Fine and Applied Arts

School of Music

College of Engineering

College of Law

College of Medicine

School of Nursing

College of Pharmacy

College of Veterinary Medicine

Annual Report

Franz Theodore Stone Laboratory (Formerly Lake Laboratory)

General Catalogue Number*

Information for Prospective Students

Summer Quarter

Time Schedule

University Directory*

Short Courses in Agriculture

Twilight School

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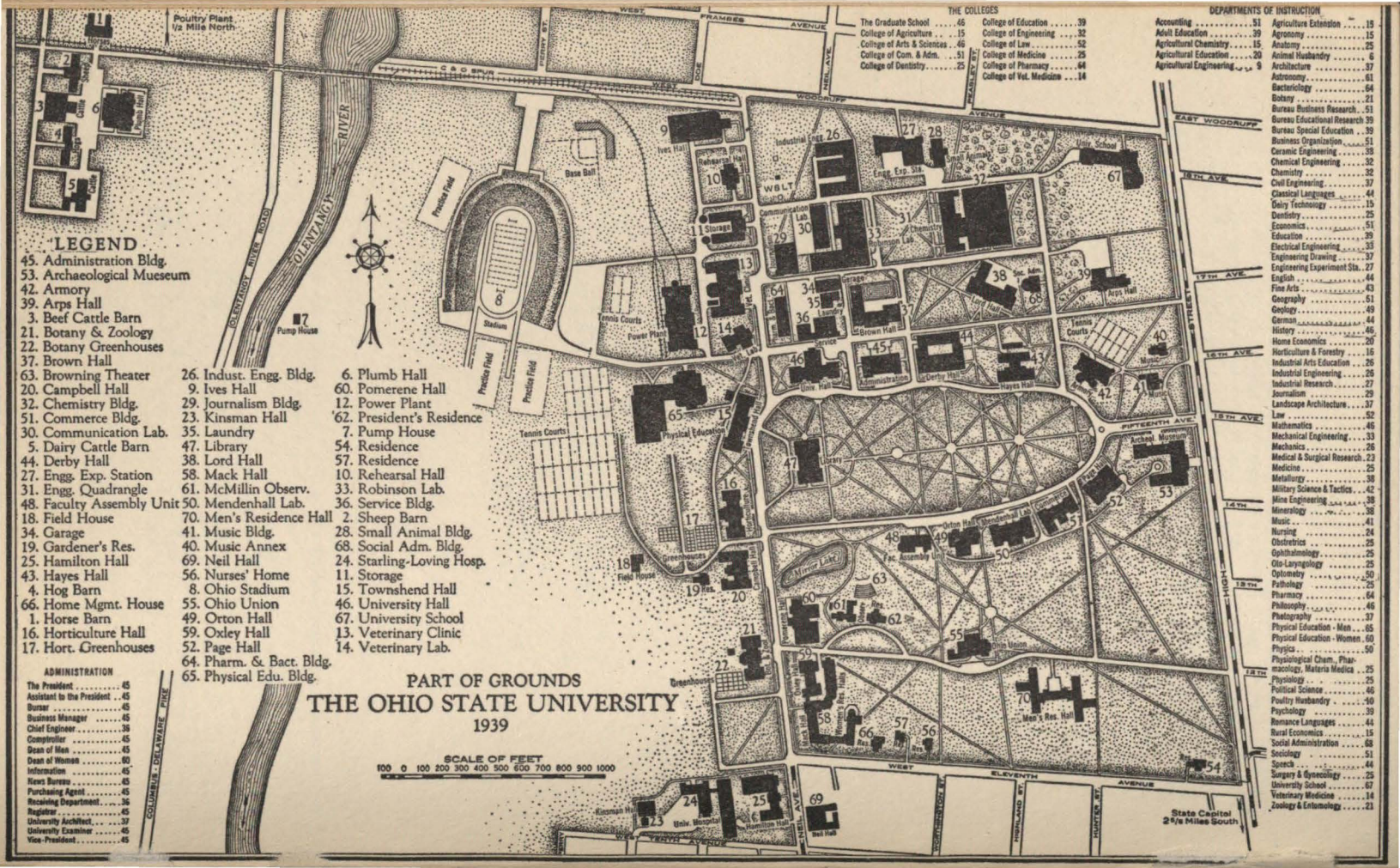
* The General Catalogue Number and the University Directory are distributed without charge for official purposes. To individuals, the price of the General Catalogue Number is 50 cents a copy and the University Directory 25 cents.



LEGEND

45. Administration Bldg.
53. Archaeological Mueseum
42. Armory
39. Arps Hall
3. Beef Cattle Barn
21. Botany & Zoology
22. Botany Greenhouses
37. Brown Hall
63. Browning Theater
20. Campbell Hall
32. Chemistry Bldg.
51. Commerce Bldg.
30. Communication Lab.
5. Dairy Cattle Barn
44. Derby Hall
27. Engg. Exp. Station
31. Engg. Quadrangle
48. Faculty Assembly Unit
18. Field House
34. Garage
19. Gardener's Res.
25. Hamilton Hall
43. Hayes Hall
4. Hog Barn
66. Home Mgmt. House
1. Horse Barn
16. Horticulture Hall
17. Hort. Greenhouses
26. Indust. Engg. Bldg.
9. Ives Hall
29. Journalism Bldg.
23. Kinsman Hall
35. Laundry
47. Library
38. Lord Hall
58. Mack Hall
61. McMillin Observ.
50. Mendenhall Lab.
70. Men's Residence Hall
41. Music Bldg.
40. Music Annex
69. Neil Hall
56. Nurses' Home
8. Ohio Stadium
55. Ohio Union
49. Orton Hall
59. Oxley Hall
52. Page Hall
64. Pharm. & Bact. Bldg.
65. Physical Edu. Bldg.
6. Plumb Hall
60. Pomerene Hall
12. Power Plant
62. President's Residence
7. Pump House
54. Residence
57. Residence
10. Rehearsal Hall
33. Robinson Lab.
36. Service Bldg.
2. Sheep Barn
28. Small Animal Bldg.
68. Social Adm. Bldg.
24. Starling-Loving Hosp.
11. Storage
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67. University School
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14. Veterinary Lab.

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Dean of Women	60
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Receiving Department	36
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PART OF GROUNDS
THE OHIO STATE UNIVERSITY
1939

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